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November 25, 2013

Mr. Richard Nussbaum P.E., R.G.
Chief, Permits Section
Missouri Department of Natural Resources
Hazardous Waste Program
P.O. Box 176
1730 Elm Street (Lower Level)
Jefferson City, MO 65101 (65102 PO Box)

Re: Evaluation of the Natural Occurrence of Arsenic and Manganese in the Missouri River Alluvium and Associated Groundwater; and Association of Elevated Arsenic and Manganese Concentrations in the Presence of Hydrocarbons
Cook Composites and Polymers Co., North Kansas City Facility
EPA ID MOD086787371

Dear Mr. Nussbaum:

Enclosed please find a White Paper that presents discussion and evaluation of arsenic and manganese concentrations at the CCP Facility in North Kansas City, Missouri. The White Paper includes evaluation of the natural occurrence of arsenic and manganese in the Missouri River alluvium and associated groundwater. The White Paper also includes discussion of the association of elevated arsenic and manganese concentrations in the presence of hydrocarbons at the Facility. CCP looks forward to continued work with MDNR under the Expedited Corrective Action Program. Please contact me at 816-391-6324 with any questions.

Sincerely,
CCP Composites US LLC

Eric Nelson
Director – HSEQ

cc:

Christine Jump
USEPA Region 7
Mail Code: AWMDRCAP
11201 Renner Boulevard
Lenexa KS 66219

Sushmita Sharma
Permits Section
MDNR, Hazardous Waste Program
500 NE Colbern Road
Lee's Summit, MO 64086

Sharon Shelton
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

529917

Enclosures: *Evaluation of the Natural Occurrence of Arsenic and Manganese in the Missouri River Alluvium and Associated Groundwater; and Association of Elevated Arsenic and Manganese Concentrations in the Presence of Hydrocarbons at the CCP NKC Facility*

Burns & McDonnell Engineering Company
9400 Ward Parkway
Kansas City, Missouri 64114
PO Box 419173 (64141-6173)
www.burnsmcd.com

Burns & McDonnell SINCE 1898

Phone: (816) 822-3168
Fax: (816) 822-3463

TRANSMITTAL MEMORANDUM

To: Chief, Permits Section MDNR, Hazardous Waste Program PO Box 176 1730 Elm Street (Lower Level) Jefferson City, MO 65101 (65102 for PO Box) Attention: Richard Nussbaum	Date: 12/05/2013 Project: Cook Composites and Polymers (CCP) North Kansas City, Missouri Via: FedEx Subject: Evaluation of the Natural Occurrence of Arsenic and Manganese in the Missouri River Alluvium and Associated Groundwater; and Association of Elevated Arsenic and Manganese Concentrations in the Presence of Hydrocarbons at the CCP NKC Facility BMcD Project Number: 61367

We are transmitting:

No. of copies	Description
1 Hard Copy 1 CD	Evaluation of the Natural Occurrence of Arsenic and Manganese in the Missouri River Alluvium and Associated Groundwater; and Association of Elevated Arsenic and Manganese Concentrations in the Presence of Hydrocarbons at the CCP NKC Facility Cook Composites and Polymers Co. North Kansas City Facility EPA ID# MOD086787371
	Please note, a CD with the full electronic version of the report is provided in a sleeve on the last page of the document.

Copies to: Records/File
Project Manager

1 Hard Copy & 1 CD
Christine Jump
USEPA Region 7
Mail Code: AWMDRCAP
11201 Renner Boulevard
Lenexa, KS 66219

2 Hard Copies & 2 CDs
Eric Nelson, Director - HSEQ
Sherri Zeller, Environmental Engineer
CCP Composites US
820 East 14th Avenue
North Kansas City, MO 64116

1 Hard Copy & 1 CD
Sushmita Sharma
MDNR – Hazardous Waste Program
500 NE Colbern Road
Lee's Summit, MO 64086

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Sharon Shelton

By: Sharon Shelton, Project Manager
sshelton@burnsmcd.com

Burns & McDonnell
SINCE 1898

Date: November 25, 2013

To: Eric Nelson, Director – HSEQ, CCP

From: Sharon Shelton, Project Manager, BMcD
Brian Hoye, Geologist, BMcD

Re: Evaluation of the Natural Occurrence of Arsenic and Manganese in the Missouri River Alluvium and Associated Groundwater; and Association of Elevated Arsenic and Manganese Concentrations in the Presence of Hydrocarbons at the CCP NKC Facility
CCP Composites US, LLC
920 East 14th Avenue
North Kansas City, MO
BMcD Project 61367 (CCP Authorization 38)

This white paper was prepared to fulfill the requirements of Authorization 38 between CCP Composites US, LLC (CCP) and Burns & McDonnell Engineering Inc. (BMcD). The following memorandum presents the findings from a literature review on the natural occurrence of arsenic and manganese in the Missouri River alluvium and associated groundwater in the vicinity of the 920 East 14th Avenue facility in North Kansas City, Missouri (Facility). Also presented in this memorandum is a statistical evaluation of the occurrence of dissolved arsenic and manganese levels in groundwater to better understand background concentrations of these parameters at the Facility. The information presented in this memorandum was compiled from multiple sources including scientific research journals, United States Geological Survey (USGS) publications and databases, regional water supply data, and other peer reviewed publications. While site-specific data obtained from the *Final RCRA Facility Investigation (RFI) Report* (BMcD, 2008) and routine groundwater sampling events are included in this review, published literature was used to present the regional occurrence of arsenic and manganese in groundwater and soil within the Missouri River alluvial aquifer. For the purposes of this paper, the term "background" is considered the amount of naturally occurring arsenic and/or anthropogenic arsenic not related to a Facility point source. The location and layout of the Facility is presented on Figures 1 and 2, respectively.

Background and Purpose

Groundwater samples have periodically been collected at the Facility since 2003. These samples have consistently exhibited concentrations of total and dissolved arsenic in excess of the 10 microgram per liter (µg/L) Safe Drinking Water Act (SDWA) Maximum Contaminant Level (MCL) (USEPA, 2013). Groundwater samples have also consistently exhibited concentrations of total and dissolved manganese in excess of the 320 µg/L USEPA Regional Screening Level (RSL) (USEPA, 2013).[1] Since arsenic and manganese are known to occur naturally in the Missouri River alluvium and associated groundwater, research was performed to determine if the concentrations of these metals in groundwater at the Facility are consistent with and likely related to naturally occurring background or potentially related to Facility activities. This memorandum also presents a statistical evaluation performed on the Facility datasets to identify potential background ranges of dissolved arsenic and dissolved manganese. Once potential

[1] An MCL does not exist for manganese. Therefore, the USEPA RSL for tapwater is used as the groundwater screening level.

background levels were established, they were used to assess trends in dissolved manganese and arsenic, and their distribution related to Facility groundwater impacts.

Environmental Setting

A description of the environmental investigations and history of the Facility is presented in the *RFI Report* prepared by BMcD (2008). This report presents a summary of the Facility and identifies contamination at the Facility. Since the RFI, routine groundwater samples have been collected from Facility monitoring wells to monitor trends in groundwater quality. In general, the following contaminant trends have been identified at the Facility:

- Ethylbenzene, styrene, xylene, and naphthalene are present in soil and groundwater at the highest concentrations in the vicinity of Monitoring Wells MW-8, MW-9, and MW-10;
- Volatile organic compounds (VOCs) and 1,4-dioxane have been observed in groundwater to depths of approximately 60 feet below ground surface (bgs);
- Light Nonaqueous Phase Liquid (LNAPL) has been periodically observed in Monitoring Well MW-10; and,
- Arsenic and manganese have been observed in groundwater across the Facility at concentrations above screening criteria.

It should be noted that an anthropogenic source of arsenic and manganese has not been identified at the Facility. As a result, it is assumed that the elevated concentrations of these constituents are a result of the biogeochemical reactions presented herein.

Hydrogeological Setting

When assessing trends in water quality parameters, it is important to first understand the hydrogeological setting and trends in groundwater migration. A description of the regional and Facility-specific hydrogeology is presented in Section 2.3 of the *RFI Report* (BMcD, 2008). The following text presents a summary of the RFI findings and should be taken into consideration when identifying potential background concentrations for chemicals of potential concern (COPCs).

As presented above, the Facility is located within a meander loop of the Missouri River with little or no relief present (see Figure 1). The sediments beneath the Facility are alluvial deposits that were laid-down during the lateral migration of the Missouri River channel. Well logs from the area indicate the Facility is underlain by approximately 100 feet of alluvium deposited by fluvial processes within the ancestral and modern Missouri River Valley. The Quaternary-aged Missouri River alluvial deposits beneath the Facility include clays of varying plasticity, silts containing variable clay and sand components, poorly to well graded sands, well graded clayey gravel, and a gravel-sand mixture.

Boring logs from Facility production wells indicate that the alluvial deposits extend to approximately 100 feet bgs. This alluvial overburden sequence generally contains the following: silty or clayey soils with associated fill and debris (0 to 5 feet bgs); silt, silty and/or sandy clay (5 to 20 feet bgs); fine to medium sand with lignite and associated silt or clay seams (20 to 50 feet bgs); and generally coarse sand from approximately 50 to 100 feet bgs with indication of large cobbles and boulders below 80 ft bgs. The lower Pleasanton Group (of Pennsylvanian Age) is present beneath the alluvial sequence. Stratigraphic data from a boring advanced near former CCP Production Well #2 indicates that the Pennsylvanian deposits immediately below the alluvium consist of hard, gray, calcareous shale (Wenck, 2001).

While the hydraulic gradients are generally small across the Facility (approximately 1.60×10^{-4} to 8.70×10^{-4}), inferred groundwater velocities have been observed at rates as high as 34.49 feet per year (ft/y). The velocity and direction of groundwater flow is highly variable at the Facility and believed to be influenced by the Missouri River flood stage. Groundwater flow directions have been observed at the Facility ranging from due east to due west. Periodically, a groundwater ridge has been observed bisecting the Facility resulting in groundwater migration to the north and south. This variability in groundwater migration has made the identification of background conditions a particular challenge at the Facility.

Regional and Facility-Specific Occurrence of Arsenic

Arsenic Geochemistry

The mobilization of arsenic in groundwater is generally controlled by the redox potential (Eh) of groundwater, pH, and the presence of oxyhydroxides capable of adsorbing and binding arsenic (Brown et al., 2010 and Ghosh et al., 2003). Naturally occurring arsenic in soil may be present as specific minerals or as an adsorbed phase on metal (primarily iron) oxyhydroxides and other clay minerals (Brown et al., 2010, Ghosh et al, 2003, Korte, 1990, and Welch et al, 2000). These minerals are generally stable under normal oxidizing conditions found in shallow aquifers (Ghosh et al, 2003). Introduction of biodegradable organic carbon can create reduced aquifer conditions, thereby reducing the more stable, oxidized species into more mobile (soluble) species. For example, the more stable ferric iron (Fe[III]) oxides reduce to the more mobile ferrous iron (Fe[II]) form, and arsenic is also reduced from As(V) to the As(III) (Brown et al, 2010 and Williams et al, 2006). As iron is dissolved and released into the groundwater, adsorbed arsenic is also released, resulting in increased dissolved iron and dissolved arsenic concentrations in groundwater. As groundwater with elevated dissolved iron and dissolved arsenic concentrations contacts oxidizing conditions in the aquifer (either due to attenuation of hydrocarbons or downgradient migration into areas where reducing potential is no longer present), iron is re-oxidized and re-precipitates, which provides new sites for arsenic adsorption, thus attenuating the dissolved iron and dissolved arsenic groundwater plumes (Brown et al, 2010 and Ghosh et al, 2003, Welch et al, 2000).

Even at low concentrations in soil, arsenic can concentrate in groundwater through the process presented above, resulting in groundwater concentrations above the MCL of 10 µg/L (Erickson, 2005 and Welch et al, 2000). Given that an anthropogenic source of arsenic has not been identified at the Facility, this type of mobilization could be the potential driving mechanism responsible for elevated arsenic levels in groundwater at the Facility.

Arsenic in Soil

Given the mechanisms described above, it is important to assess the presence or absence of arsenic in native soil when assessing arsenic trends in groundwater. The following paragraphs present the findings of a literature review to identify regional background concentrations and the results of Facility-specific background sample analysis. The results of this review indicate that arsenic is naturally present at the Facility and throughout Clay County, Missouri. While literature and other reports were obtained which identified background concentrations of arsenic at environmental sites within the Kansas City Metro Area, it was difficult to verify whether the background samples identified in these papers were indicative of true background conditions or had been influenced by activities related to the environmental sites investigated. As a result, these data were not included in this assessment, and the soil assessment was limited to the data sources identified in the following paragraphs.

Arsenic concentrations for surface soil in Clay County, Missouri are presented in Tidball's (1984) report *Geochemical Survey of Missouri, Geological Survey Professional Paper 954-H,I.* Tidball (1984) presented arsenic results for 10 surface soil samples collected from 0-7 inches bgs at locations throughout Clay County, Missouri. Arsenic was reported for all 10 of the surface soil samples at concentrations ranging from 6.9 to 12 parts per million (ppm).

Soil samples were collected at and near the Facility as part of the RFI. The *RFI Report* (BMcD, 2008) presents metals results for background soil samples collected just outside of the CCP NKC Facility and soil samples that were collected as part of the RFI. Four background samples were collected at depths from 2 to 5 feet bgs at the locations near the Facility. While this is a limited background dataset, it provides insight into the presence or absence of arsenic at and immediately adjacent to the Facility. Arsenic concentrations ranged from 9.48 to 16.9 milligrams per kilogram (mg/kg) in the Facility-specific background samples with an average concentration of 13 mg/kg. The *RFI Report* also presents arsenic results for 74 soil samples collected from 0.5 feet bgs to 23 feet bgs at the Facility. Arsenic concentrations ranged from 0.96 to 18.7 mg/kg in the RFI samples with an average concentration of 6 mg/kg.

The following table presents a summary of arsenic concentration in soil as identified by the aforementioned studies:

Concentrations of Arsenic in Soil							
Source	**Number of Samples**	**Depth**	**Number of Detections**	**Min (mg/kg)**	**Max (mg/kg)**	**Ave. (mg/kg)**	**Median (mg/kg)**
BACKGROUND							
Clay County, Missouri	10	0-7 inches	10	6.9 ppm	12 ppm	9.9 ppm	9.9 ppm
CCP NKC Facility (offsite)	4	2-5 feet	4	9.48 mg/kg	16.9 mg/kg	13 mg/kg	13 mg/kg
CCP FACILITY							
CCP NKC Facility (onsite)	74	0.5-23 feet	74	0.96 mg/kg	18.7 mg/kg	6 mg/kg	5.36 mg/kg

Arsenic concentrations for background samples presented for the Facility and Clay County (Tidball, 1984) are consistent and similar. These results suggest arsenic is naturally present at the CCP NKC Facility. Furthermore, an absence of a "hot spot" at the Facility provides supporting evidence that an anthropogenic source of arsenic is not present.

Arsenic in Groundwater

The following section presents an assessment of the regional and Facility-specific occurrence of arsenic in groundwater. This assessment was performed using historical groundwater sampling data collected at the Facility and regional groundwater sample results as presented in the published literature. Efforts were made to only include groundwater data in this report that are particular to the Missouri River watershed in general proximity to the Facility.

Water quality data for samples collected from the City of Independence, Missouri municipal water supply well field, and the associated monitoring well network were reviewed from a USGS water quality report (Kelly, 2002). Monitoring and supply wells sampled in this study are screened within the Missouri River alluvium approximately 15 miles downstream from the Facility. Dissolved arsenic results were presented by Kelly (2002) for 49 samples collected from 27 monitoring wells and the supply wells combined intake from December 1998 through 2000. Dissolved arsenic concentrations reported for the 49 samples ranged in concentration from <1 µg/L to 47 µg/L (Kelly, 2002). Six of the 49 samples collected from the City of Independence, Missouri well field were reported above the MCL of 10 µg/L.

In a 1989 USGS open file report, the regional occurrence of arsenic in groundwater was characterized for two sections of the Missouri River alluvial aquifer (Ziegler et al., 1993). This study focused on portions of the Missouri River identified as the "Northwestern Reach", present from the Iowa-Missouri border to Saint Joseph, Missouri, and the "West-Central Reach", present from Kansas City, Missouri to Miami, Missouri. Groundwater samples presented in the Ziegler et al. (1993) investigation were obtained from the following sources: domestic-supply wells, livestock-supply wells, and irrigation wells. The CCP Facility is located in the upstream extent of the West-Central reach of the Missouri River as identified by Ziegler et al (1993), and only that data is included herein.

The majority of the monitoring wells presented by Ziegler et al. (1993) for the West-Central Reach of the Missouri River are located downstream of the Facility. In 1989, 28 wells located within the West-Central Reach of the Missouri River watershed were sampled for total recoverable arsenic. The wells were located in Clay, Carroll, Jackson, Lafayette, Ray and Saline Counties. Total arsenic was reported above the reporting limit for 6 of the 28 samples at concentrations ranging from 6 µg/L to 14 µg/L. Three groundwater samples collected from the West-Central Reach were reported above the 10 µg/L MCL.

Dissolved arsenic results for groundwater samples collected from the Facility monitoring well network from March 2003 through June 2013 are presented in Table 1. With the exception of Monitoring Wells MW-8, MW-9, MW-10, and MW-12, wells at the Facility exhibit similar concentrations across the site. The historical average concentration of dissolved arsenic at Monitoring Wells MW-8, MW-9, MW-10, and MW-12 ranges from 55.4 µg/L to 246.9 µg/L. The remaining monitoring wells screened within the shallow aquifer exhibited average concentrations of dissolved arsenic ranging from 12.2 µg/L for Monitoring Well MW-11 to 22.2 µg/L for Monitoring Well MW-6. MW-9 has historically exhibited the highest concentrations of dissolved arsenic at the Facility. An anthropogenic source of arsenic has not been identified at the Facility and arsenic was not used in historic site operations. A summary of arsenic in groundwater is presented in the following table.

Concentrations of Arsenic in Groundwater								
Source / Well	**Number of Samples**	**Total or Dissolved**	**Depth**	**Number of Detections**	**Minimum (µg/L)**	**Maximum (µg/L)**	**Average (µg/L)**	**Median (µg/L)**
BACKGROUND								
City of Independence, MO	21	Dissolved	Not Available*	14	<1	33	5.3	1
West Central Reach Missouri River Alluvium	28	Total	Not Available*	16	<5	14	6.0	<5
CCP FACILITY								
MW-1	18	Dissolved	Shallow Aquifer	16	10.1	49	26.2	24.0
MW-2A	18	Dissolved	Shallow Aquifer	16	8.4 J	46	24.9	24.0
MW-3	18	Dissolved	Shallow Aquifer	13	6.8 J	24	12.5	12.0
MW-4	18	Dissolved	Shallow Aquifer	12	0.94 J	45	12.7	7.5
MW-5	18	Dissolved	Shallow Aquifer	16	4.6 J	100 U / 25	13.8	12.0
MW-6	17	Dissolved	Shallow Aquifer	15	4.4 J	100 U / 45	22.2	18.0
MW-7	18	Dissolved	Shallow Aquifer	14	1.7 J	100 U / 34	16.9	12.9
MW-8	18	Dissolved	Shallow Aquifer	17	10 U	140	55.4	49.5
MW-8D	2	Dissolved	Deep Aquifer	2	0.47 J	1.6 J	1.0	1.0
MW-9	18	Dissolved	Shallow Aquifer	18	152	330	246.9	254.0
MW-9D	2	Dissolved	Deep Aquifer	1	1.2 J	5 U / 1.2 J	1.9	1.9
MW-10	17	Dissolved	Shallow Aquifer	17	31.8	120	74.1	75.0
MW-10D	2	Dissolved	Deep Aquifer	1	0.35 J	5 U / 0.35 J	1.4	1.4
MW-11	18	Dissolved	Shallow Aquifer	15	1.5 J	30	12.2	9.0
MW-12	18	Dissolved	Shallow Aquifer	18	34.9	140	83.4	82.8
MW-1	17	Total	Shallow Aquifer	17	15.2	160	54.7	43.0
MW-2A	17	Total	Shallow Aquifer	16	8.7 J	120	37.4	34.5

** Information was not presented in the referenced publication.*

Concentrations of Arsenic in Groundwater (Continued)								
Source / Well	**Number of Samples**	**Total or Dissolved**	**Depth**	**Number of Detections**	**Minimum (µg/L)**	**Maximum (µg/L)**	**Average (µg/L)**	**Median (µg/L)**
CCP FACILITY								
MW-3	18	Total	Shallow Aquifer	17	10 U	181	32.7	23.5
MW-4	18	Total	Shallow Aquifer	17	1.1 J	92.8	46	44.5
MW-5	17	Total	Shallow Aquifer	16	4.6 J	79	32.6	24
MW-6	16	Total	Shallow Aquifer	16	18.1	150	49.8	41
MW-7	17	Total	Shallow Aquifer	16	2.7 J	140	41.6	27
MW-8	17	Total	Shallow Aquifer	17	34.7	170	64.7	58
MW-8D	2	Total	Deep Aquifer	2	0.94 J	5.4	3.2	3.2

With the exception of MW-8, MW-9, MW-10, and MW-12, the groundwater results for the Facility are of comparable range and magnitude to the dissolved arsenic concentrations reported for the City of Independence, Missouri municipal well field. Because total arsenic was reported by the Ziegler et al. (1993,) a direct comparison of the Facility dissolved arsenic concentrations could not be made to this data. Total arsenic concentrations for Facility wells are generally above those reported by Ziegler at al. (1993); however, Facility wells were sampled using bailers, which are known to raise sample turbidity and result in elevated concentrations of total metals. Samples collected by Ziegler et al. (1993) were obtained from well spigots after purging each well for approximately 10 minutes. Due to the difference in sampling methodology a direct comparison of total metals results for Facility wells and the Ziegler report is inappropriate. While turbidity values were not included in the Ziegler et al. (1993) report, the purging of these wells likely resulted in a sample with few suspended solids as compared to a sample obtained from a well that had been bailed. The total arsenic concentrations presented for the Missouri River alluvium in Ziegler et al. (1993) indicate that arsenic is regionally present in groundwater at concentrations exceeding the MCL of 10 µg/L.

<u>Regional and Facility-Specific Occurrence of Manganese</u>

Manganese Geochemistry

Manganese behaves in a similar fashion to iron when exposed to reducing conditions (Williams et al, 2006). In the presence of a degradable carbon source (i.e., anthropogenic hydrocarbons) dissolved oxygen (DO) becomes depleted and bacteria will preferentially utilize the next most efficient electron acceptor. This is generally nitrate, or insoluble manganese (Mn[IV]), followed by ferric iron. Under reducing conditions, the more stable oxidized species (Mn [IV]) are reduced to the more soluble species (Mn [II]), resulting in increased manganese concentrations in groundwater (Kearney, 1997 and Williams et al, 2006). As presented below, manganese has been documented in surface soils, subsurface soils, and groundwater present at the Facility and throughout the Missouri River alluvial system, suggesting manganese is naturally occurring at the Facility.

Manganese in Soil

Manganese is a naturally occurring element that is abundant in the regional mineralogy. To better understand the occurrence of manganese at the Facility, manganese concentrations for soil samples collected during the RFI (BMcD, 2008) were compared to background manganese levels presented for Clay County, Missouri (Tidball, 1984).

Tidball (1984) presented manganese concentration for 10 surface soil samples collected throughout Clay County, Missouri. Manganese concentrations for soil were presented as ppm with sample concentrations ranging from 387 ppm to 1,291 ppm. The mean and median manganese concentrations for the 10 samples were 754 ppm and 904 ppm, respectively, with a standard deviation of 288 ppm.

The *RFI Report* presents metals results for background soil samples collected just outside of the Facility. Four samples were collected from 2 to 5 feet bgs. The concentrations of manganese ranged from 284 mg/kg to 1,060 mg/kg, with an average concentration of 547 mg/kg.

The *RFI Report* also presents manganese results for investigative soil samples collected within the Facility. Seventeen samples were collected from 0.5 feet bgs to 23 feet bgs. The concentrations of manganese ranged from 26.1 to 863 mg/kg, with an average concentration of 395 mg/kg.

A summary of manganese concentrations in soil is presented in the following table:

Concentrations of Manganese in Soil								
Source	**Number of Samples**	**Depth**	**Units**	**Number of Detections**	**Minimum**	**Maximum**	**Average**	**Median**
BACKGROUND								
Clay County, Missouri	10	0-7 inches	ppm	10	387	1,291	754	904
Facility (offsite)	4	2-5 feet	mg/kg	4	415	1,060	520	421
CCP FACILITY								
Facility (onsite)	17	0.5-23 feet	mg/kg	17	26.1	863	395	443

Manganese concentrations for the Facility are comparable to those presented by Tidball (1984). These results suggest that elevated levels of manganese in soil were not identified at the Facility during the RFI.

Manganese in Groundwater

Kelly (2002) presented dissolved manganese concentrations for groundwater samples collected from the City of Independence, Missouri public water supply well field and the associated monitoring well network. Dissolved manganese was reported for 49 groundwater samples collected from 27 site monitoring wells and the combined supply well intake. Samples presented by Kelly (2002) were collected from December 1997 through May 2000. Dissolved manganese was reported above the method detection limit for all 49 samples at concentrations ranging from 95 µg/L to 1,930 µg/L. Thirty-nine of the 49 sample results exceeded the RSL of 320 µg/L.

Dissolved manganese results for groundwater samples collected from the Facility monitoring well network from March 2003 through June 2013 are presented in the following table. Dissolved manganese was detected in all of the groundwater samples collected at concentrations ranging from 78 µg/L to 12,800µg/L. Dissolved manganese was reported above the RSL of 320 µg/L for 212 of the 226 samples collected from the Facility. The mean and median concentrations for dissolved manganese encountered at the Facility are 1,164 µg/L and 1,000 µg/L, respectively. A summary of the historic detections for dissolved manganese is presented in Table 1.

A summary of the City of Independence, Missouri public water supply well field for manganese in groundwater versus the data collected from the Facility's monitoring well network is presented in the following table:

Background Concentrations of Manganese in Groundwater

Source	Number of Samples	Total or Dissolved	Depth	Number of Detections	Minimum (µg/L)	Maximum (µg/L)	Average (µg/L)	Median (µg/L)
BACKGROUND								
City of Independence, MO	49	Dissolved	Not Available*	49	95	1,930	780	671
CCP Facility								
MW-1	18	Dissolved	Shallow Aquifer	18	660	1610	941	925
MW-2A	18	Dissolved	Shallow Aquifer	18	780	2050 J-	1394	1300
MW-3	18	Dissolved	Shallow Aquifer	18	604	5200	1704	1400
MW-4	18	Dissolved	Shallow Aquifer	18	78	1600	834	890
MW-5	18	Dissolved	Shallow Aquifer	18	890	4900	1856	1650
MW-6	17	Dissolved	Shallow Aquifer	17	789	1840	1287	1300
MW-7	18	Dissolved	Shallow Aquifer	18	630	3200	1264	1170
MW-8	18	Dissolved	Shallow Aquifer	18	344	942	587	580
MW-8D	2	Dissolved	Deep Aquifer	2	570	650	610	610
MW-9	18	Dissolved	Shallow Aquifer	18	190	800	358	325
MW-9D	2	Dissolved	Deep Aquifer	2	440	500	470	470
MW-10	17	Dissolved	Shallow Aquifer	17	160	9500	1655	1100
MW-10D	2	Dissolved	Deep Aquifer	2	410	570	490	490
MW-11	18	Dissolved	Shallow Aquifer	18	536	2600	1286	1100
MW-12	18	Dissolved	Shallow Aquifer	18	700	3100	1411	1350
MW-1	17	Total	Shallow Aquifer	17	820	1700	1141	1100

** Information was not presented in the referenced publication.*

Background Concentrations of Manganese in Groundwater (Continued)								
Source	**Number of Samples**	**Total or Dissolved**	**Depth**	**Number of Detections**	**Minimum (µg/L)**	**Maximum (µg/L)**	**Average (µg/L)**	**Median (µg/L)**
CCP Facility								
MW-2A	17	Total	Shallow Aquifer	17	680	4600	1769	1640
MW-3	18	Total	Shallow Aquifer	18	690	12800	3002	1915
MW-4	18	Total	Shallow Aquifer	18	72	2850	954	960
MW-5	17	Total	Shallow Aquifer	17	1200	4900	2164	2000
MW-6	16	Total	Shallow Aquifer	16	839	1900	1374	1400
MW-7	17	Total	Shallow Aquifer	17	911	3300	1566	1300
MW-8	17	Total	Shallow Aquifer	17	430	2500	1060	820
MW-8D	2	Total	Deep Aquifer	2	610	690	650	650
MW-9	18	Total	Shallow Aquifer	18	200	4640	995	615
MW-9D	2	Total	Deep Aquifer	2	430	510	470	470
MW-10	17	Total	Shallow Aquifer	17	221	9800	1943	1200
MW-10D	2	Total	Deep Aquifer	2	420	550	485	485
MW-11	17	Total	Shallow Aquifer	17	890	2600	1465	1300
MW-12	18	Total	Shallow Aquifer	18	1200	3620	1859	1650

The range of dissolved manganese concentrations for monitoring wells at the Facility are similar and consistent with the concentrations reported for the City of Independence municipal supply well field.

Identification of Background Concentrations – Arsenic and Manganese

This section presents a discussion of dissolved arsenic and manganese in Facility groundwater and the identification of background conditions. Given the Facility's unique hydrogeological setting this discussion relies heavily on the statistical evaluation of the Facility dataset to identify background conditions. Specifically, the variability in groundwater flow direction and velocity observed at the Facility results in an unpredictable distribution of COPCs which complicates assigning background concentrations to groundwater. Attachment A includes potentiometric surface maps as presented in Facility groundwater monitoring reports. These figures illustrate the variability of potentiometric surfaces observed at the Facility.

In a homogeneous aquifer, COPCs tend to form a predictable distribution when relatively stable trends in groundwater migration are present. This distribution is the result of COPCs migrating away from a source area (point-source or area of mobilization) resulting in the following impacts to groundwater:

- COPCs are present at background concentrations immediately upgradient of the source area and crossgradient to any resultant groundwater plume;
- Downgradient concentrations are highest at the source area with concentrations decreasing with distance from the source area in the downgradient direction. The rate at which groundwater concentrations decrease is a function of the attenuation rate of the contaminant.
- COPCs are present at background concentrations at the downgradient edge of the groundwater plume (due to attenuation of the plume via biodegradation, sorption, dispersion, and/or dilution).

Identifying background conditions is relatively straightforward under stable hydrogeologic conditions and can be accomplished by assessing the COPC concentrations of wells that are geographically up-, side-, or down-gradient of a dissolved phase plume boundary.

As identified above, variability in Facility groundwater flow direction prevents the identification of definitive upgradient and downgradient wells. This is likely a result of the Missouri River's influence over the Facility's hydrogeology at variable flood stages. As a result, statistical evaluation was used to assess the Facility dataset as a whole to identify COPC-specific background and non-background populations independent of geographic location. This was accomplished using probability plots as presented in the Naval Facilities Engineering Command (NFEC) User's Guide UG-2059-ENV titled *Guidance for Environmental Background Analysis Volume III: Groundwater* (Battelle Memorial Institute [Battelle] et al., 2004). Once a background concentration was established, t-tests and time series plots were used as to assess whether or not the background and non-background populations represent unique populations and whether or not discernible trends are evident in the distribution of the Facility data.

The Facility data were prepared as follows prior to generating probability plots as outlined in NFEC User's Guide UG-2059-ENV (Battelle et al, 2004). Datasets used in preparing probability plots for dissolved arsenic and dissolved manganese are presented on Tables 2 and 3, respectively.

1. Duplicate samples were not included in this statistical analysis to avoid artificially weighting any one data point. The higher value of the duplicate sample pair was selected for use in the statistical evaluation.
2. Non-detect values were represented in the general population as one-half the reporting limit, consistent with NFEC User's Guide UG-2059-ENV's recommendations.
3. Each sample is considered spatially and/or temporally independent of one another.

To generate a probability plot the selected data set was ranked in order of increasing concentration (dissolved arsenic or dissolved manganese) and a cumulative percentage was calculated for each value. The cumulative percentage was then plotted against the value to produce a probability plot. The data set used in preparing probability plots for dissolved arsenic and dissolved manganese is presented in Tables 2 and 3, respectively. Attachment B presents the probability plots resulting from this assessment.

T-test results and time series plots were also used to assess the Facility datasets. The results of the t-tests are presented in Attachment C and are discussed below. Time series plots are presented in Attachment D. A discussion of the Facility data and the identification of background conditions are presented in the following paragraphs.

Dissolved Arsenic

The Facility-wide dissolved arsenic probability plot was used to test the null hypothesis that the detections of dissolved arsenic represent one population exhibiting a normal distribution. The non-linear presentation of the Facility-wide dissolved arsenic probability plot does not support this hypothesis. Rather, the probability plot presents two linear segments that are separated by a vertex located within the curved portion of the probability plot. The linear segments exhibiting unique slopes are indicative of two unique populations exhibiting slightly skewed populations. When there is no overlap in these populations a distinct vertex can be observed on the probability plot. The curved portion of the Facility-wide dissolved arsenic probability plot may indicate that the two population distributions are overlapping, or that one of the datasets is skewed.

To assign a background population, the dataset was split into background and non-background populations based upon the shape of the probability plot. When a distinct change in the slope of the probability plot is present, the point of inflection represents the upper limit of the background population and the lower limit of the non-background population. In the absence of a distinct vertex, the upper limit of the background population was assigned where the probability plot begins to exhibit nonlinear trends (See Chart 1 in Attachment B). This is a conservative approach to assigning a background population, as the data range that may contain overlap in the two populations is assigned to the non-background population.

Individual probability plots were also prepared for the background and non-background population data sets identified on the arsenic probability plot. As presented on Chart 2 of Attachment B, the background population exhibits a linear distribution with a slightly convex orientation. This suggests the background concentration is normally distributed to slightly skewed. The non-background population exhibits a non-linear distribution which is to be expected.

To assign a numeric value to the upper limit of background concentrations, trend lines were applied to the background and non-background datasets as presented on the dissolved arsenic probability plot (see Chart 1 of Attachment B). The intersection of the two trend lines was assigned as a conservative upper limit of background concentrations of 47.8 µg/L for dissolved arsenic in Facility groundwater. This is a conservative value because a small portion of the background population identified on the arsenic probability plot (0 µg/L to 53 µg/L) is above the calculated numeric limit of 47.8 µg/L.

T-tests were performed to assess the comparability of the background and non-background populations identified using the probability plot. The null hypothesis was that the mean concentrations of the two populations were equal. The t-tests were performed assuming both equal and unequal variances, and the resulting P-values were 1.62×10^{-45} and 1.13×10^{-14}, respectively. Since these P-values are less than a 0.01 level of significance ($\alpha = 0.01$), the null hypothesis is rejected, indicating the two datasets are representative of statistically different populations.

The time series plots included in Attachment D present the historic concentrations of dissolved arsenic in Facility monitoring wells. As presented on the time series chart, the majority of the Facility wells routinely exhibit dissolved arsenic concentrations below the calculated background concentration of 47.8 µg/L. Wells that have routinely exceeded this background concentration include Monitoring Wells MW-

8, MW-9, MW-10, and MW-12. Monitoring Wells MW-8, MW-9, and MW-10 are in relatively close proximity to the VOC source area where arsenic may be activity mobilized. Furthermore, LNAPL has been periodically observed at Monitoring Well MW-10. Elevated concentrations at these locations should be expected given the mobilization mechanisms identified above.

Perimeter Monitoring Well MW-12 consistently exhibits concentrations of dissolved arsenic that exceed the calculated background range, and it is the only perimeter monitoring well which exhibits concentrations of dissolved arsenic above the calculated background range. While Monitoring Well MW-12 is regularly downgradient from the area where arsenic mobilization is believed to occur, perimeter Monitoring Well MW-11 is also regularly downgradient from the potential source area, and dissolved arsenic concentrations for Monitoring Well MW-11 are consistently within the calculated background range. This variation in dissolved arsenic concentrations between Monitoring Wells MW-11 and MW-12 may be the result of another (potentially offsite) source of dissolved arsenic impacting Monitoring Well MW-12. Alternatively, aspects of the hydrogeology that may prevent dissolved arsenic from reaching Monitoring Well MW-11 may not have been identified at this time.

Dissolved Manganese

A probability plot was prepared for dissolved manganese using the Facility-wide dataset as described previously. The probability plot was used to test the null hypothesis that the Facility-wide dataset represents one normally-distributed population, which would result in a straight line on the probability plot. As presented on Chart 3 of Attachment B, the dissolved manganese probability plot includes two linear segments exhibiting unique slopes with a relatively well defined vertex. This suggests two unique populations are present in the dataset, whose distributions may have a slight overlap. Background and non-background populations were defined by breaking the data set at the point where the probability plot trends away from a linear distribution.

Probability plots were then prepared for the resulting background and non-background populations to assess the distribution of the resulting populations. These probability plots are presented on Chart 4 of Attachment B. The probability plot for the background population is linear in nature, which suggests a single population of normal distribution is present. The non-background population does not exhibit a linear probability plot suggesting that this data set is extremely limited or skewed.

To assign a numeric value to the upper limit of background concentrations, trend lines were applied to the background and non-background datasets as presented on the dissolved manganese probability plot (see Chart 3 of Attachment B). The intersection of the two trend lines was assigned as a conservative upper limit of background concentrations for dissolved manganese in Facility groundwater (1,740 µg/L). This is a conservative value because the upper portion of the background population identified on the manganese probability plot (78 µg/L to 1,970 µg/L) is above the calculated numeric limit of 1,740 µg/L.

T-tests were performed to compare the background and non-background datasets, as defined on the manganese probability plot, to further assess whether or not the data sets represent statically unique populations. The null hypothesis was that the mean concentrations of the two populations were equal. T-tests were performed assuming equal and unequal variance, resulting in P-Values of 3.29×10^{-31} and 8.93

x 10^{-5}, respectively. Since these P values are below 0.01 level of significance ($\alpha = 0.01$), the null hypothesis is rejected, indicating the two datasets are representative of statistically different populations.

Time series plots were prepared for the dissolved manganese detections in Facility wells and are presented in Attachment D. As presented on the time series charts, manganese is consistently detected below the calculated background value (1,740 µg/L) in the Facility monitoring wells, and no one well consistently exhibits elevated dissolved manganese concentrations. The most recent exceedances of the calculated background concentration was during the September 2011 sampling event for Monitoring Wells MW-3, MW-10, and MW-11 and during the March 2013 sampling event at Monitoring Well MW-11. With the exception of the aforementioned detections, dissolved manganese has been reported below the calculated screening level of 1,740 µg/L.

Comparison of Dissolved Arsenic and Dissolved Manganese to Degradable Carbon Sources

As presented above, elevated arsenic concentrations have been commonly observed at Monitoring Wells MW-8, MW-9, MW-10, and MW-12. Given the biogeochemical process responsible for the mobilization of arsenic at environmental sites with degradable carbon sources it would be expected to see elevated concentrations of dissolved arsenic in wells located in close proximity to reducing conditions. As the distance increases away from a degradable carbon source the aquifer is anticipated to switch from a reducing environment to oxidizing, and any arsenic that was mobilized will reabsorb to the native mineralogy, coming out of solution. In general, the elevated arsenic concentrations observed in Facility monitoring wells support this scenario. With the exception of Monitoring Well MW-12, wells exhibiting elevated concentrations of dissolved arsenic are in close proximity areas where VOC impacts have been identified. Monitoring Well MW-12 is a perimeter well that consistently exhibits elevated dissolved arsenic concentrations. While it is possible that this location is receiving mobilized arsenic from the site, other perimeter wells that are commonly downgradient from the Facility do not also exhibit arsenic concentrations above the calculated background value (e.g., Monitoring Wells MW-4 and MW-11). At this time it is unknown what mechanisms are contributing to the elevated arsenic concentrations in Monitoring Well MW-12.

Given the variable nature of the dissolved manganese detections across the Facility it is not possible to assess trends in this parameter with respect to VOC occurrences. Dissolved manganese exceedances of the calculated background value (1,740 µg/L) have primarily been reported at Monitoring Wells MW-3, MW-5, and MW-10. With the exception of MW-10, these wells do not correspond with the wells exhibiting arsenic concentrations above background and/or elevated concentrations of VOCs.

In March and June 2013, total and dissolved iron samples were collected from Facility wells to assess whether or not iron exhibits a similar distribution to arsenic and/or manganese. Dissolved iron was detected in samples collected from Facility wells at concentrations ranging from 4,800 µg/L to 62,000 µg/L. No discernible trends were identified for iron in relation to dissolved arsenic or manganese. Because iron is present across the Facility it is assumed that the observed iron concentrations are reflective of the regional aquifer and are not indicative of Facility-specific conditions.

Summary and Conclusions

The Facility is located within a meander loop of the Missouri River which contributes to a highly variable hydrogeological setting. Frequent changes in the direction of groundwater flow have complicated the identification of definitive upgradient monitoring wells, preventing the identification of background conditions through an assessment of geographic trends in COPC distribution. COPCs commonly observed at concentrations above applicable screening criteria include VOCs, naphthalene, Bis(2-ethylhexyl) phthalate (BEHP), and select metals. LNAPL has been periodically observed at Monitoring Well MW-10 with the last occurrence documented during the April 2011 monitoring event.

Arsenic and manganese have been observed at concentrations above applicable screening criteria at locations across the Facility. These metals are naturally occurring elements that comprise the native mineralogy found in the Missouri River alluvial system (Brown et al., 2010 and Ghosh et al., 2003). The release of a degradable carbon source to the subsurface commonly results in a transition from oxidizing to reducing conditions which have the potential to mobilize iron, arsenic, and manganese through biogeochemical processes (Brown et al, 2010 and Williams et al, 2006). These mechanisms are likely the driver of increased arsenic and manganese concentrations at the Facility.

A statistical evaluation was performed to identify the upper limit of the background concentrations for arsenic and manganese for groundwater at the Facility using a combination of probability plots, t-tests, and time series plots. The upper limit assigned to the background levels of dissolved arsenic and dissolved manganese are 47.8 µg/L and 1,740 µg/L, respectively. Arsenic concentrations have been consistently observed above the calculated background concentration of 47.8 µg/L in the following wells: MW-8, MW-9, MW-10, and MW-12. Exceedances of the dissolved manganese background level are more sporadic in nature and no one well has been consistently observed at concentrations above the calculated background concentration.

The distribution of dissolved arsenic with respect to background conditions generally supports the assumption that arsenic is being mobilized in the presence of a degradable carbon source. Monitoring Wells MW-8, MW-9, and MW-10 are located in close proximity to the portion of the Facility where elevated concentrations of VOCs and LNAPL have been observed. These constituents have the capacity to act as a degradable carbon source mobilizing arsenic and manganese through the mechanisms described within this discussion, which would explain the elevated arsenic concentrations in these monitoring wells.

Dissolved arsenic concentrations in Monitoring Well MW-12 have been consistently reported above the calculated background concentration of 47.8 µg/L. At this time a determination of the source of arsenic at MW-12 cannot be made. It is possible that these concentrations are the result of the downgradient migration of arsenic from the Facility; however, MW-12 is commonly cross-gradient to the Facility, and perimeter Monitoring Wells MW-5 and MW-11, which are also commonly downgradient, do not exhibit elevated levels of arsenic.

While consistently present above the USEPA RSL of 320 µg/L, the statistical evaluation presented herein suggests that the majority of the dissolved manganese detections reported for the Facility are below the calculation background concentration of 1,740 µg/L. The variable nature of the dissolved manganese detections prevents definitive statements from being made about the source of dissolved manganese in Facility groundwater.

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TABLES

Table 1
Historic Groundwater Data - Dissolved Arsenic and Manganese
CCP Composites US LLC
North Kansas City, Missouri

			Dissolved Metals	
			Arsenic	Manganese
Well	Round	Date	ug/L	ug/L
MW-1	0	3/7/2003	**10.1**	**672**
MW-1	1	6/22/2004	20 U	**752**
MW-1	2	9/28/2004	**26**	**850 B**
MW-1	3	7/8/2005	**11 J**	**720**
MW-1	4	12/22/2005	**22**	**940**
MW-1	5	11/16/2006	**32**	**960**
MW-1	6	5/31/2007	15 U	**800**
MW-1	7	1/30/2008	**19**	**860**
MW-1	8	7/29/2008	**48 B**	**1,300**
MW-1	9	3/24/2009	**28**	**990**
MW-1	10	9/22/2009	**48**	**1,200**
MW-1	11	3/30/2010	**12.8**	**775**
MW-1	12	9/14/2010	**49**	**1,610**
MW-1	13	3/22/2011	**37**	**940**
MW-1	14	9/12/2011	**23**	**1,000**
MW-1	15	4/24/2012	**16**	**660**
MW-1	16	9/12/2012	**47**	**1,000**
MW-1	17	3/26/2013	**25**	**910**
MW-2A	0	3/7/2003	10 U	**1,240**
MW-2A	1	6/23/2004	10 U	**1,060**
MW-2A	2	9/28/2004	**12 J**	**1,400 B**
MW-2A	3	7/8/2005	**8.4 J**	**1,300**
MW-2A	4	12/22/2005	**8.9 J**	**1,300**
MW-2A	5	11/16/2006	**16**	**1,200**
MW-2A	6	5/31/2007	**24**	**1,300**
MW-2A	7	1/30/2008	**19**	**1,700**
MW-2A	8	7/29/2008	**29 B**	**1,800**
MW-2A	9	3/24/2009	**17**	**1,500**
MW-2A	10	9/23/2009	**24**	**1,800**
MW-2A	11	4/1/2010	**28.1**	**1,590**
MW-2A	12	9/15/2010	**35**	**2,050 J-**
MW-2A	13	3/23/2011	**37**	**1,300**
MW-2A	14	9/12/2011	**46**	**1,800**
MW-2A	15	4/25/2012	**44**	**980**
MW-2A	16	9/13/2012	**44**	**970**
MW-2A	17	3/27/2013	**46**	**780**
MW-3	0	3/6/2003	10 U	**604**
MW-3	1	6/22/2004	10 U	**3,720**
MW-3	2	9/27/2004	**8.9 J**	**5,200**
MW-3	3	7/8/2005	**12 J**	**1,100**

Table 1
Historic Groundwater Data - Dissolved Arsenic and Manganese
CCP Composites US LLC
North Kansas City, Missouri

			Dissolved Metals	
			Arsenic	Manganese
Well	Round	Date	ug/L	ug/L
MW-3	4	12/22/2005	**24**	**1,300**
MW-3	5	11/16/2006	**17**	**1,100**
MW-3	6	6/1/2007	**12 J**	**1,400**
MW-3	7	1/31/2008	15 U	**2,000**
MW-3	8	7/29/2008	20 BU*	**1,100**
MW-3	9	3/23/2009	**6.8 J**	**1,700**
MW-3	10	9/23/2009	**13 J**	**1,400**
MW-3	11	3/30/2010	10 U	**1,500**
MW-3	12	9/15/2010	10 U	**1,960**
MW-3	13	3/22/2011	**12**	**1,600**
MW-3	14	9/12/2011	**11**	**2,000**
MW-3	15	4/24/2012	**22**	**1,300**
MW-3	16	9/12/2012	**21**	**1,000**
MW-3	17	3/26/2013	**17**	**690**
MW-4	0	3/6/2003	**17.3**	**1,370**
MW-4	1	6/22/2004	**28.6**	**822**
MW-4	2	9/27/2004	15 U	**270**
MW-4	3	7/8/2005	15 U	**820**
MW-4	4	12/22/2005	**11 J**	**860**
MW-4	5	11/16/2006	**20**	**950**
MW-4	6	5/31/2007	**45**	**890**
MW-4	7	1/30/2008	**7.7 J**	**1,100**
MW-4	8	7/29/2008	**34 B**	**1,200**
MW-4	9	3/23/2009	15 U	**890**
MW-4	10	9/22/2009	15 U	**78**
MW-4	11	3/31/2010	10 U	**945**
MW-4	12	9/14/2010	10 U	**936**
MW-4	13	3/22/2011	**0.94 J**	**430**
MW-4	14	9/12/2011	**18**	**930**
MW-4	15	4/24/2012	**1.7 J**	**470**
MW-4	16	9/12/2012	**1.1 J**	**450**
MW-4	17	3/26/2013	**3.0 J**	**1,600**
MW-5	0	3/6/2003	100 U	**1,230**
MW-5	1	6/23/2004	10 U	**1,440**
MW-5	2	9/28/2004	**13 J**	**1,200 B**
MW-5	3	7/8/2005	**8.2 J**	**1,200**
MW-5	4	12/22/2005	**6.7 J**	**1,200**
MW-5	5	11/16/2006	**6.9 J**	**2,400**
MW-5	6	5/31/2007	**12 J**	**4,900**
MW-5	7	1/31/2008	**25**	**1,700**

Table 1
Historic Groundwater Data - Dissolved Arsenic and Manganese
CCP Composites US LLC
North Kansas City, Missouri

			Dissolved Metals	
			Arsenic	Manganese
Well	Round	Date	ug/L	ug/L
MW-5	8	7/30/2008	**12 J**	**3,200**
MW-5	9	3/23/2009	**16**	**2,300**
MW-5	10	9/22/2009	**8.4 J**	**1,300**
MW-5	11	3/30/2010	**15.5**	**1,580**
MW-5	12	9/14/2010	**14.5**	**1,970**
MW-5	13	3/22/2011	**10**	**1,800**
MW-5	14	9/14/2011	**16**	**1,800**
MW-5	15	4/24/2012	**18**	**1,600**
MW-5	16	9/13/2012	**4.6 J**	**1,700**
MW-5	17	3/27/2013	**5.7**	**890**
MW-6	0	3/6/2003	100 U	**1,100**
MW-6	1	6/22/2004	10 U	**789**
MW-6	2	9/28/2004	**20**	**1,000 B**
MW-6	3	7/8/2005	**4.4 J**	**900**
MW-6	4	12/22/2005	**10 J**	**1,200**
MW-6	5	11/16/2006	**12 J**	**1,300**
MW-6	6	5/31/2007	**8.3 J**	**870**
MW-6	8	7/30/2008	**9.1 J**	**1,300**
MW-6	9	3/23/2009	**18**	**1,700**
MW-6	10	9/22/2009	**15**	**1,400**
MW-6	11	3/30/2010	**14.9**	**1,360**
MW-6	12	9/14/2010	**18.9**	**1,840**
MW-6	13	3/22/2011	**36**	**1,700**
MW-6	14	9/12/2011	**32**	**1,400**
MW-6	15	4/24/2012	**43**	**1,300**
MW-6	16	9/12/2012	**36**	**1,800**
MW-6	17	3/27/2013	**45**	**920**
MW-7	0	3/7/2003	100 U	**1,240**
MW-7	1	6/23/2004	10 U	**1,240**
MW-7	2	9/28/2004	**5.4 J**	**1,100 B**
MW-7	3	7/8/2005	**4.7 J**	**1,300**
MW-7	4	12/22/2005	15 U	**1,300**
MW-7	5	11/16/2006	**4.8 J**	**1,300**
MW-7	6	5/31/2007	**6.4 J**	**1,600**
MW-7	7	1/31/2008	15 U	**1,300**
MW-7	8	7/30/2008	**15**	**3,200**
MW-7	9	3/25/2009	**18**	**1,000**
MW-7	10	9/22/2009	**29**	**1,400**
MW-7	11	3/30/2010	**10.8**	**1,030**
MW-7	12	9/14/2010	**24.2**	**944**

Table 1
Historic Groundwater Data - Dissolved Arsenic and Manganese
CCP Composites US LLC
North Kansas City, Missouri

			Dissolved Metals	
			Arsenic	Manganese
Well	Round	Date	ug/L	ug/L
MW-7	13	3/23/2011	**33**	**630**
MW-7	14	9/13/2011	**28**	**1,100**
MW-7	15	4/24/2012	**20**	**1,100**
MW-7	16	9/13/2012	**34**	**1,000**
MW-7	17	3/27/2013	**1.7 J**	**970**
MW-8	0	3/7/2003	10 U	**942**
MW-8	1	6/23/2004	**12**	**780**
MW-8	2	9/28/2004	**89**	**820 B**
MW-8	3	7/8/2005	**71**	**590**
MW-8	4	12/22/2005	**52**	**580**
MW-8	5	11/16/2006	**53**	**600**
MW-8	6	6/1/2007	**35**	**630**
MW-8	7	1/30/2008	**140**	**380**
MW-8	8	7/29/2008	**69 B**	**760**
MW-8	9	3/24/2009	**87**	**510**
MW-8	10	9/23/2009	**41**	**410**
MW-8	11	3/31/2010	**41**	**511**
MW-8	12	9/15/2010	**31.4**	**344**
MW-8	13	3/23/2011	**72**	**490**
MW-8	14	9/13/2011	**41**	**480**
MW-8	15	4/25/2012	**67**	**480**
MW-8	16	9/13/2012	**47**	**660**
MW-8	17	3/27/2013	**41**	**570**
MW-9	0	3/6/2003	**256**	**343**
MW-9	1	6/22/2004	**152**	**242**
MW-9	2	9/28/2004	**330**	**320 B**
MW-9	3	7/8/2005	**190**	**210**
MW-9	4	12/22/2005	**260**	**220**
MW-9	5	11/16/2006	**250**	**240**
MW-9	6	6/1/2007	**190**	**210**
MW-9	7	1/30/2008	**240**	**480**
MW-9	8	7/29/2008	**180 B**	**410**
MW-9	9	3/24/2009	**270**	**540**
MW-9	10	9/22/2009	**290**	**800**
MW-9	11	3/31/2010	**224**	**277**
MW-9	12	9/14/2010	**252**	**553**
MW-9	13	3/23/2011	**270**	**420**
MW-9	14	9/13/2011	**330**	**380**
MW-9	15	4/25/2012	**260**	**330**
MW-9	16	9/13/2012	**270**	**280**

Table 1
Historic Groundwater Data - Dissolved Arsenic and Manganese
CCP Composites US LLC
North Kansas City, Missouri

			Dissolved Metals	
			Arsenic	Manganese
Well	Round	Date	ug/L	ug/L
MW-9	17	3/27/2013	**220**	**180**
MW-10	0	3/6/2003	**52.1**	**3,180**
MW-10	1	6/22/2004	**31.8**	**202**
MW-10	2	9/28/2004	**79**	**1,100 B**
MW-10	3	7/8/2005	**40**	**160**
MW-10	4	12/22/2005	**62**	**700**
MW-10	5	11/16/2006	**75**	**650**
MW-10	6	5/31/2007	**60**	**160**
MW-10	7	1/30/2008	**55**	**1,500**
MW-10	8	7/29/2008	**65 B**	**750**
MW-10	9	3/24/2009	**51**	**1,400**
MW-10	10	9/22/2009	**120**	**9,500**
MW-10	11	3/31/2010	**87.2**	**1,560**
MW-10	13	3/23/2011	**120**	**2,000**
MW-10	14	9/13/2011	**86**	**2,200**
MW-10	15	4/25/2012	**84**	**780**
MW-10	16	9/13/2012	**110**	**1,000**
MW-10	17	3/2/2013	**82**	**1,300**
MW-11	0	3/6/2003	**21.3**	**1,040**
MW-11	1	6/22/2004	**19.5**	**536**
MW-11	2	9/27/2004	**9.5 J**	**970**
MW-11	3	7/8/2005	**28**	**730**
MW-11	4	12/22/2005	15 U	**1,000**
MW-11	5	11/16/2006	**13 J**	**1,100**
MW-11	6	5/31/2007	**30**	**890**
MW-11	7	1/31/2008	15 U	**880**
MW-11	8	7/30/2008	**13 J**	**1,100**
MW-11	9	3/25/2009	**4.8 J**	**1,100**
MW-11	10	9/23/2009	**8.4 J**	**1,300**
MW-11	11	3/31/2010	**15.3**	**1,530**
MW-11	12	9/15/2010	10 U	**2,090**
MW-11	13	3/22/2011	**4.2 J**	**1,600**
MW-11	14	9/12/2011	**21**	**2,600**
MW-11	15	4/24/2012	**8.3**	**1,300**
MW-11	16	9/12/2012	**2.5 J**	**890**
MW-11	17	3/2/2013	**1.5 J**	**2,500**
MW-12	0	3/6/2003	**41.3**	**1,350**
MW-12	1	6/22/2004	**34.9**	**970**
MW-12	2	9/27/2004	**65**	**1,500**
MW-12	3	7/8/2005	**66**	**700**

Table 1
Historic Groundwater Data - Dissolved Arsenic and Manganese
CCP Composites US LLC
North Kansas City, Missouri

			Dissolved Metals	
			Arsenic	Manganese
Well	Round	Date	ug/L	ug/L
MW-12	4	12/22/2005	**85**	**890**
MW-12	5	11/16/2006	**96**	**1,200**
MW-12	6	5/31/2007	**68**	**920**
MW-12	7	1/31/2008	**62**	**1,300**
MW-12	8	7/30/2008	**57**	**3,100**
MW-12	9	3/25/2009	**110**	**1,400**
MW-12	10	9/22/2009	**88**	**2,100**
MW-12	11	3/31/2010	**80.6**	**1,220**
MW-12	12	9/15/2010	**92**	**1,350**
MW-12	13	3/22/2011	**130**	**1,700**
MW-12	14	9/13/2011	**140**	**1,200**
MW-12	15	4/24/2012	**120**	**1,600**
MW-12	16	9/12/2012	**110**	**1,400**
MW-12	17	3/27/2013	**55**	**1,500**
PRODWELL-1	0	3/7/2003	100 U	**420**
PRODWELL-1	3	7/8/2005	15 U	**410**
PRODWELL-1	4	12/22/2005	15 U	**430**
PRODWELL-1	5	11/16/2006	**5.2 J**	**420**
PRODWELL-1	6	5/31/2007	15 U	**470**
PRODWELL-1	7	1/31/2008	15 U	**420**
MW-8D	17	3/27/2013	**1.6 J**	**650**
MW-8D	18	6/18/2013	**0.47 J**	**570**
MW-9D	17	3/28/2013	**1.2 J**	**440**
MW-9D	18	6/18/2013	5 U	**500**
MW-10D	17	3/28/2013	**0.35 J**	**570**
MW-10D	18	6/18/2013	5 U	**410**

Notes:

U = Analyte was not detected above the reporting limit

J = Analyte is estimated at the reported concentration

J- = Analyte is estimated with potential low bias

U* = Analyte was qualified as nondetect during the validation review

Table 2
Dataset for Statistical Analysis - Dissolved Arsenic
CCP Composites US LLC
North Kansas City, Missouri

Well ID	Round	Date	Value[1]	Cumulative Percentage
MW-10A	18	6/18/2013	0.165	0.88
MW-9A	18	6/18/2013	0.165	0.88
MW-10A	17	3/28/2013	**5**	12.39
MW-11	13	3/22/2011	**5**	12.39
MW-11	16	9/12/2012	**5**	12.39
MW-11	17	3/2/2013	**5**	12.39
MW-4	13	3/22/2011	**5**	12.39
MW-4	15	4/24/2012	**5**	12.39
MW-4	16	9/12/2012	**5**	12.39
MW-4	17	3/26/2013	**5**	12.39
MW-6	3	7/8/2005	**5**	12.39
MW-7	17	3/27/2013	**5**	12.39
MW-8A	17	3/27/2013	**5**	12.39
MW-8A	18	6/18/2013	**5**	12.39
MW-9A	17	3/28/2013	**5**	12.39
MW-11	12	9/15/2010	5	12.39
MW-2A	0	3/7/2003	5	12.39
MW-2A	1	6/23/2004	5	12.39
MW-3	0	3/6/2003	5	12.39
MW-3	1	6/22/2004	5	12.39
MW-3	11	3/30/2010	5	12.39
MW-3	12	9/15/2010	5	12.39
MW-4	11	3/31/2010	5	12.39
MW-4	12	9/14/2010	5	12.39
MW-5	1	6/23/2004	5	12.39
MW-6	1	6/22/2004	5	12.39
MW-7	1	6/23/2004	5	12.39
MW-8	0	3/7/2003	5	12.39
MW-11	9	3/25/2009	**8**	24.78
MW-3	9	3/23/2009	**8**	24.78
MW-4	7	1/30/2008	**8**	24.78
MW-5	3	7/8/2005	**8**	24.78
MW-5	4	12/22/2005	**8**	24.78
MW-5	5	11/16/2006	**8**	24.78
MW-5	16	9/13/2012	**8**	24.78
MW-5	17	3/27/2013	**8**	24.78
MW-6	6	5/31/2007	**8**	24.78
MW-7	2	9/28/2004	**8**	24.78
MW-7	3	7/8/2005	**8**	24.78
MW-7	5	11/16/2006	**8**	24.78
MW-7	6	5/31/2007	**8**	24.78

Table 2
Dataset for Statistical Analysis - Dissolved Arsenic
CCP Composites US LLC
North Kansas City, Missouri

Well ID	Round	Date	Value[1]	Cumulative Percentage
PRODWELL-1	5	11/16/2006	**8**	24.78
MW-1	6	5/31/2007	8	24.78
MW-11	4	12/22/2005	8	24.78
MW-11	7	1/31/2008	8	24.78
MW-3	7	1/31/2008	8	24.78
MW-4	2	9/27/2004	8	24.78
MW-4	3	7/8/2005	8	24.78
MW-4	9	3/23/2009	8	24.78
MW-4	10	9/22/2009	8	24.78
MW-7	4	12/22/2005	8	24.78
MW-7	7	1/31/2008	8	24.78
PRODWELL-1	3	7/8/2005	8	24.78
PRODWELL-1	4	12/22/2005	8	24.78
PRODWELL-1	6	5/31/2007	8	24.78
PRODWELL-1	7	1/31/2008	8	24.78
MW-3	2	9/27/2004	**9**	25.22
MW-6	8	7/30/2008	**9**	25.66
MW-11	2	9/27/2004	**10**	26.11
MW-11	15	4/24/2012	**10**	28.76
MW-2A	3	7/8/2005	**10**	28.76
MW-5	13	3/22/2011	**10**	28.76
MW-6	4	12/22/2005	**10**	28.76
MW-1	1	6/22/2004	10	28.76
MW-3	8	7/29/2008	10	28.76
MW-1	0	3/7/2003	**10**	29.20
MW-7	11	3/30/2010	**11**	29.65
MW-1	3	7/8/2005	**11**	30.97
MW-3	14	9/12/2011	**11**	30.97
MW-4	4	12/22/2005	**11**	30.97
MW-2A	2	9/28/2004	**12**	34.51
MW-3	3	7/8/2005	**12**	34.51
MW-3	6	6/1/2007	**12**	34.51
MW-3	13	3/22/2011	**12**	34.51
MW-5	6	5/31/2007	**12**	34.51
MW-5	8	7/30/2008	**12**	34.51
MW-6	5	11/16/2006	**12**	34.51
MW-8	1	6/23/2004	**12**	34.51
MW-1	11	3/30/2010	**13**	34.96
MW-11	5	11/16/2006	**13**	36.73
MW-11	8	7/30/2008	**13**	36.73
MW-3	10	9/23/2009	**13**	36.73

Table 2
Dataset for Statistical Analysis - Dissolved Arsenic
CCP Composites US LLC
North Kansas City, Missouri

Well ID	Round	Date	Value[1]	Cumulative Percentage
MW-5	2	9/28/2004	**13**	36.73
MW-5	12	9/14/2010	**15**	37.17
MW-6	11	3/30/2010	**15**	37.61
MW-6	10	9/22/2009	**15**	38.50
MW-7	8	7/30/2008	**15**	38.50
MW-11	11	3/31/2010	**15**	38.94
MW-5	11	3/30/2010	**16**	39.38
MW-1	15	4/24/2012	**16**	41.15
MW-2A	5	11/16/2006	**16**	41.15
MW-5	9	3/23/2009	**16**	41.15
MW-5	14	9/14/2011	**16**	41.15
MW-2A	9	3/24/2009	**17**	42.48
MW-3	5	11/16/2006	**17**	42.48
MW-3	17	3/26/2013	**17**	42.48
MW-4	0	3/6/2003	**17**	42.92
MW-4	14	9/12/2011	**18**	44.69
MW-5	15	4/24/2012	**18**	44.69
MW-6	9	3/23/2009	**18**	44.69
MW-7	9	3/25/2009	**18**	44.69
MW-6	12	9/14/2010	**19**	45.13
MW-1	7	1/30/2008	**19**	46.02
MW-2A	7	1/30/2008	**19**	46.02
MW-11	1	6/22/2004	**20**	46.46
MW-4	5	11/16/2006	**20**	47.79
MW-6	2	9/28/2004	**20**	47.79
MW-7	15	4/24/2012	**20**	47.79
MW-11	14	9/12/2011	**21**	48.67
MW-3	16	9/12/2012	**21**	48.67
MW-11	0	3/6/2003	**21**	49.12
MW-1	4	12/22/2005	**22**	50.00
MW-3	15	4/24/2012	**22**	50.00
MW-1	14	9/12/2011	**23**	50.44
MW-2A	6	5/31/2007	**24**	51.77
MW-2A	10	9/23/2009	**24**	51.77
MW-3	4	12/22/2005	**24**	51.77
MW-7	12	9/14/2010	**24**	52.21
MW-1	17	3/26/2013	**25**	53.10
MW-5	7	1/31/2008	**25**	53.10
MW-1	2	9/28/2004	**26**	53.54
MW-1	9	3/24/2009	**28**	54.87
MW-11	3	7/8/2005	**28**	54.87

Table 2
Dataset for Statistical Analysis - Dissolved Arsenic
CCP Composites US LLC
North Kansas City, Missouri

Well ID	Round	Date	Value[1]	Cumulative Percentage
MW-7	14	9/13/2011	**28**	54.87
MW-2A	11	4/1/2010	**28**	55.31
MW-4	1	6/22/2004	**29**	55.75
MW-2A	8	7/29/2008	**29**	56.64
MW-7	10	9/22/2009	**29**	56.64
MW-11	6	5/31/2007	**30**	57.08
MW-8	12	9/15/2010	**31**	57.52
MW-10	1	6/22/2004	**32**	57.96
MW-1	5	11/16/2006	**32**	58.85
MW-6	14	9/12/2011	**32**	58.85
MW-7	13	3/23/2011	**33**	59.29
MW-4	8	7/29/2008	**34**	60.18
MW-7	16	9/13/2012	**34**	60.18
MW-12	1	6/22/2004	**35**	60.62
MW-2A	12	9/15/2010	**35**	61.50
MW-8	6	6/1/2007	**35**	61.50
MW-6	13	3/22/2011	**36**	62.39
MW-6	16	9/12/2012	**36**	62.39
MW-1	13	3/22/2011	**37**	63.27
MW-2A	13	3/23/2011	**37**	63.27
MW-10	3	7/8/2005	**40**	63.72
MW-8	10	9/23/2009	**41**	65.49
MW-8	11	3/31/2010	**41**	65.49
MW-8	14	9/13/2011	**41**	65.49
MW-8	17	3/27/2013	**41**	65.49
MW-12	0	3/6/2003	**41**	65.93
MW-6	15	4/24/2012	**43**	66.37
MW-2A	15	4/25/2012	**44**	67.26
MW-2A	16	9/13/2012	**44**	67.26
MW-4	6	5/31/2007	**45**	68.14
MW-6	17	3/27/2013	**45**	68.14
MW-2A	14	9/12/2011	**46**	69.03
MW-2A	17	3/27/2013	**46**	69.03
MW-1	16	9/12/2012	**47**	69.91
MW-8	16	9/13/2012	**47**	69.91
MW-1	8	7/29/2008	**48**	70.80
MW-1	10	9/22/2009	**48**	70.80
MW-1	12	9/14/2010	**49**	71.24
MW-11	10	9/23/2009	**50**	74.34
MW-2A	4	12/22/2005	**50**	74.34
MW-5	10	9/22/2009	**50**	74.34

Table 2
Dataset for Statistical Analysis - Dissolved Arsenic
CCP Composites US LLC
North Kansas City, Missouri

Well ID	Round	Date	Value[1]	Cumulative Percentage
MW-5	0	3/6/2003	50	74.34
MW-6	0	3/6/2003	50	74.34
MW-7	0	3/7/2003	50	74.34
PRODWELL-1	0	3/7/2003	50	74.34
MW-10	9	3/24/2009	**51**	74.78
MW-8	4	12/22/2005	**52**	75.22
MW-10	0	3/6/2003	**52**	75.66
MW-8	5	11/16/2006	**53**	76.11
MW-10	7	1/30/2008	**55**	76.99
MW-12	17	3/27/2013	**55**	76.99
MW-12	8	7/30/2008	**57**	77.43
MW-10	6	5/31/2007	**60**	77.88
MW-10	4	12/22/2005	**62**	78.76
MW-12	7	1/31/2008	**62**	78.76
MW-10	8	7/29/2008	**65**	79.65
MW-12	2	9/27/2004	**65**	79.65
MW-12	3	7/8/2005	**66**	80.09
MW-8	15	4/25/2012	**67**	80.53
MW-12	6	5/31/2007	**68**	80.97
MW-8	8	7/29/2008	**69**	81.42
MW-8	3	7/8/2005	**71**	81.86
MW-8	13	3/23/2011	**72**	82.30
MW-10	5	11/16/2006	**75**	82.74
MW-10	2	9/28/2004	**79**	83.19
MW-12	11	3/31/2010	**81**	83.63
MW-10	17	3/2/2013	**82**	84.07
MW-10	15	4/25/2012	**84**	84.51
MW-12	4	12/22/2005	**85**	84.96
MW-10	14	9/13/2011	**86**	85.40
MW-8	9	3/24/2009	**87**	85.84
MW-10	11	3/31/2010	**87**	86.28
MW-12	10	9/22/2009	**88**	86.73
MW-8	2	9/28/2004	**91**	87.17
MW-12	12	9/15/2010	**92**	87.61
MW-12	5	11/16/2006	**96**	88.05
MW-10	16	9/13/2012	**110**	89.38
MW-12	9	3/25/2009	**110**	89.38
MW-12	16	9/12/2012	**110**	89.38
MW-10	10	9/22/2009	**120**	90.71
MW-10	13	3/23/2011	**120**	90.71
MW-12	15	4/24/2012	**120**	90.71

Table 2
Dataset for Statistical Analysis - Dissolved Arsenic
CCP Composites US LLC
North Kansas City, Missouri

Well ID	Round	Date	Value[1]	Cumulative Percentage
MW-12	13	3/22/2011	**130**	91.15
MW-12	14	9/13/2011	**140**	92.04
MW-8	7	1/30/2008	**140**	92.04
MW-9	1	6/22/2004	**152**	92.48
MW-9	8	7/29/2008	**180**	92.92
MW-9	3	7/8/2005	**190**	93.81
MW-9	6	6/1/2007	**190**	93.81
MW-9	17	3/27/2013	**220**	94.25
MW-9	11	3/31/2010	**224**	94.69
MW-9	7	1/30/2008	**240**	95.13
MW-9	5	11/16/2006	**250**	95.58
MW-9	12	9/14/2010	**252**	96.02
MW-9	0	3/6/2003	**256**	96.46
MW-9	4	12/22/2005	**260**	97.35
MW-9	15	4/25/2012	**260**	97.35
MW-9	9	3/24/2009	**270**	98.67
MW-9	13	3/23/2011	**270**	98.67
MW-9	16	9/13/2012	**270**	98.67
MW-9	10	9/22/2009	**290**	99.12
MW-9	2	9/28/2004	**330**	100.00
MW-9	14	9/13/2011	**330**	100.00

Notes:

Shading = Value was included in the non-background dataset.

[1] = The value represents The concentration of dissolved arsenic as reported for Facility Monitoring wells. For duplicate sample pairs, the higher result was chosen to represent the value. For nondetect samples,one-half of the reporting limit was used as the value.

Table 3
Dataset for Statistical Analysis - Dissolved Manganese
CCP Composites US LLC
North Kansas City, Missouri

Well ID	Round	Date	Value[1]	Cumulative Percentage
MW-4	10	9/22/2009	**78**	0.44
MW-10	3	7/8/2005	**160**	1.33
MW-10	6	5/31/2007	**160**	1.33
MW-9	17	3/27/2013	**180**	1.77
MW-10	1	6/22/2004	**202**	2.21
MW-9	3	7/8/2005	**210**	3.10
MW-9	6	6/1/2007	**210**	3.10
MW-9	4	12/22/2005	**220**	3.54
MW-9	5	11/16/2006	**240**	3.98
MW-9	1	6/22/2004	**242**	4.42
MW-4	2	9/27/2004	**270**	4.87
MW-9	11	3/31/2010	**277**	5.31
MW-9	16	9/13/2012	**280**	5.75
MW-9	2	9/28/2004	**320**	6.19
MW-9	15	4/25/2012	**330**	6.64
MW-9	0	3/6/2003	**343**	7.08
MW-8	12	9/15/2010	**344**	7.52
MW-9	14	9/13/2011	**380**	7.96
MW-8	7	1/30/2008	**400**	8.41
MW-10D	18	6/18/2013	**410**	10.18
MW-8	10	9/23/2009	**410**	10.18
MW-9	8	7/29/2008	**410**	10.18
PRODWELL-1	3	7/8/2005	**410**	10.18
MW-9	13	3/23/2011	**420**	11.95
PRODWELL-1	0	3/7/2003	**420**	11.95
PRODWELL-1	5	11/16/2006	**420**	11.95
PRODWELL-1	7	1/31/2008	**420**	11.95
MW-4	13	3/22/2011	**430**	12.83
PRODWELL-1	4	12/22/2005	**430**	12.83
MW-9D	17	3/28/2013	**440**	13.27
MW-4	16	9/12/2012	**450**	13.72
MW-4	15	4/24/2012	**470**	14.60
PRODWELL-1	6	5/31/2007	**470**	14.60
MW-8	14	9/13/2011	**480**	15.93
MW-8	15	4/25/2012	**480**	15.93
MW-9	7	1/30/2008	**480**	15.93
MW-8	13	3/23/2011	**490**	16.37
MW-9D	18	6/18/2013	**500**	16.81
MW-8	9	3/24/2009	**510**	17.26
MW-8	11	3/31/2010	**511**	17.70
MW-11	1	6/22/2004	**536**	18.14

Table 3
Dataset for Statistical Analysis - Dissolved Manganese
CCP Composites US LLC
North Kansas City, Missouri

Well ID	Round	Date	Value[1]	Cumulative Percentage
MW-9	9	3/24/2009	**540**	18.58
MW-9	12	9/14/2010	**553**	19.03
MW-10D	17	3/28/2013	**570**	20.80
MW-11	17	3/2/2013	**570**	20.80
MW-8	17	3/27/2013	**570**	20.80
MW-8D	18	6/18/2013	**570**	20.80
MW-8	3	7/8/2005	**590**	21.68
MW-8	4	12/22/2005	**590**	21.68
MW-8	5	11/16/2006	**600**	22.12
MW-3	0	3/6/2003	**604**	22.57
MW-7	13	3/23/2011	**630**	23.45
MW-8	6	6/1/2007	**630**	23.45
MW-10	5	11/16/2006	**650**	24.34
MW-8D	17	3/27/2013	**650**	24.34
MW-1	15	4/24/2012	**660**	25.22
MW-8	16	9/13/2012	**660**	25.22
MW-1	0	3/7/2003	**672**	25.66
MW-2A	17	3/27/2013	**680**	26.11
MW-3	17	3/26/2013	**690**	26.55
MW-10	4	12/22/2005	**700**	27.43
MW-12	3	7/8/2005	**700**	27.43
MW-1	3	7/8/2005	**720**	27.88
MW-11	3	7/8/2005	**730**	28.32
MW-10	8	7/29/2008	**750**	28.76
MW-1	1	6/22/2004	**752**	29.20
MW-8	8	7/29/2008	**760**	29.65
MW-1	11	3/30/2010	**775**	30.09
MW-10	15	4/25/2012	**780**	30.97
MW-8	1	6/23/2004	**780**	30.97
MW-6	1	6/22/2004	**789**	31.42
MW-1	6	5/31/2007	**800**	32.30
MW-9	10	9/22/2009	**800**	32.30
MW-4	3	7/8/2005	**820**	33.19
MW-8	2	9/28/2004	**820**	33.19
MW-4	1	6/22/2004	**822**	33.63
MW-1	2	9/28/2004	**850**	34.07
MW-1	7	1/30/2008	**860**	34.96
MW-4	4	12/22/2005	**860**	34.96
MW-6	6	5/31/2007	**870**	35.40
MW-11	7	1/31/2008	**880**	35.84
MW-11	6	5/31/2007	**890**	38.50

Table 3
Dataset for Statistical Analysis - Dissolved Manganese
CCP Composites US LLC
North Kansas City, Missouri

Well ID	Round	Date	Value[1]	Cumulative Percentage
MW-11	16	9/12/2012	**890**	38.50
MW-12	4	12/22/2005	**890**	38.50
MW-4	6	5/31/2007	**890**	38.50
MW-4	9	3/23/2009	**890**	38.50
MW-5	17	3/27/2013	**890**	38.50
MW-6	3	7/8/2005	**900**	38.94
MW-1	17	3/26/2013	**910**	39.38
MW-12	6	5/31/2007	**920**	40.27
MW-6	17	3/27/2013	**920**	40.27
MW-4	14	9/12/2011	**930**	40.71
MW-4	12	9/14/2010	**936**	41.15
MW-1	4	12/22/2005	**940**	42.04
MW-1	13	3/22/2011	**940**	42.04
MW-8	0	3/7/2003	**942**	42.48
MW-7	12	9/14/2010	**944**	42.92
MW-4	11	3/31/2010	**945**	43.36
MW-4	5	11/16/2006	**950**	43.81
MW-1	5	11/16/2006	**960**	44.25
MW-11	2	9/27/2004	**970**	46.02
MW-12	1	6/22/2004	**970**	46.02
MW-2A	16	9/13/2012	**970**	46.02
MW-7	17	3/27/2013	**970**	46.02
MW-2A	15	4/25/2012	**980**	46.46
MW-1	9	3/24/2009	**990**	46.90
MW-1	14	9/12/2011	**1,000**	50.44
MW-1	16	9/12/2012	**1,000**	50.44
MW-10	16	9/13/2012	**1,000**	50.44
MW-11	4	12/22/2005	**1,000**	50.44
MW-3	16	9/12/2012	**1,000**	50.44
MW-6	2	9/28/2004	**1,000**	50.44
MW-7	9	3/25/2009	**1,000**	50.44
MW-7	16	9/13/2012	**1,000**	50.44
MW-7	11	3/30/2010	**1,030**	50.88
MW-11	0	3/6/2003	**1,040**	51.33
MW-2A	1	6/23/2004	**1,080**	51.77
MW-10	2	9/28/2004	**1,100**	57.08
MW-11	5	11/16/2006	**1,100**	57.08
MW-11	8	7/30/2008	**1,100**	57.08
MW-11	9	3/25/2009	**1,100**	57.08
MW-3	3	7/8/2005	**1,100**	57.08
MW-3	5	11/16/2006	**1,100**	57.08

Table 3
Dataset for Statistical Analysis - Dissolved Manganese
CCP Composites US LLC
North Kansas City, Missouri

Well ID	Round	Date	Value[1]	Cumulative Percentage
MW-3	8	7/29/2008	**1,100**	57.08
MW-4	7	1/30/2008	**1,100**	57.08
MW-6	0	3/6/2003	**1,100**	57.08
MW-7	2	9/28/2004	**1,100**	57.08
MW-7	14	9/13/2011	**1,100**	57.08
MW-7	15	4/24/2012	**1,100**	57.08
MW-1	10	9/22/2009	**1,200**	61.06
MW-12	5	11/16/2006	**1,200**	61.06
MW-12	14	9/13/2011	**1,200**	61.06
MW-2A	5	11/16/2006	**1,200**	61.06
MW-4	8	7/29/2008	**1,200**	61.06
MW-5	2	9/28/2004	**1,200**	61.06
MW-5	3	7/8/2005	**1,200**	61.06
MW-5	4	12/22/2005	**1,200**	61.06
MW-6	4	12/22/2005	**1,200**	61.06
MW-12	11	3/31/2010	**1,220**	61.50
MW-5	0	3/6/2003	**1,230**	61.95
MW-2A	0	3/7/2003	**1,240**	63.27
MW-7	0	3/7/2003	**1,240**	63.27
MW-7	1	6/23/2004	**1,240**	63.27
MW-1	8	7/29/2008	**1,300**	71.68
MW-10	17	3/2/2013	**1,300**	71.68
MW-11	10	9/23/2009	**1,300**	71.68
MW-11	15	4/24/2012	**1,300**	71.68
MW-12	7	1/31/2008	**1,300**	71.68
MW-2A	3	7/8/2005	**1,300**	71.68
MW-2A	4	12/22/2005	**1,300**	71.68
MW-2A	6	5/31/2007	**1,300**	71.68
MW-2A	13	3/23/2011	**1,300**	71.68
MW-3	4	12/22/2005	**1,300**	71.68
MW-3	15	4/24/2012	**1,300**	71.68
MW-5	10	9/22/2009	**1,300**	71.68
MW-6	5	11/16/2006	**1,300**	71.68
MW-6	8	7/30/2008	**1,300**	71.68
MW-6	15	4/24/2012	**1,300**	71.68
MW-7	3	7/8/2005	**1,300**	71.68
MW-7	4	12/22/2005	**1,300**	71.68
MW-7	5	11/16/2006	**1,300**	71.68
MW-7	7	1/31/2008	**1,300**	71.68
MW-12	0	3/6/2003	**1,350**	72.57
MW-12	12	9/15/2010	**1,350**	72.57

Table 3
Dataset for Statistical Analysis - Dissolved Manganese
CCP Composites US LLC
North Kansas City, Missouri

Well ID	Round	Date	Value[1]	Cumulative Percentage
MW-6	11	3/30/2010	**1,360**	73.01
MW-4	0	3/6/2003	**1,370**	73.45
MW-10	9	3/24/2009	**1,400**	77.43
MW-12	9	3/25/2009	**1,400**	77.43
MW-12	16	9/12/2012	**1,400**	77.43
MW-2A	2	9/28/2004	**1,400**	77.43
MW-3	6	6/1/2007	**1,400**	77.43
MW-3	10	9/23/2009	**1,400**	77.43
MW-6	10	9/22/2009	**1,400**	77.43
MW-6	14	9/12/2011	**1,400**	77.43
MW-7	10	9/22/2009	**1,400**	77.43
MW-5	1	6/23/2004	**1,440**	77.88
MW-10	7	1/30/2008	**1,500**	80.09
MW-12	2	9/27/2004	**1,500**	80.09
MW-12	17	3/27/2013	**1,500**	80.09
MW-2A	9	3/24/2009	**1,500**	80.09
MW-3	11	3/30/2010	**1,500**	80.09
MW-11	11	3/31/2010	**1,530**	80.53
MW-10	11	3/31/2010	**1,560**	80.97
MW-5	11	3/30/2010	**1,580**	81.42
MW-2A	11	4/1/2010	**1,590**	81.86
MW-11	13	3/22/2011	**1,600**	84.51
MW-12	15	4/24/2012	**1,600**	84.51
MW-3	13	3/22/2011	**1,600**	84.51
MW-4	17	3/26/2013	**1,600**	84.51
MW-5	15	4/24/2012	**1,600**	84.51
MW-7	6	5/31/2007	**1,600**	84.51
MW-1	12	9/14/2010	**1,610**	84.96
MW-12	13	3/22/2011	**1,700**	88.05
MW-2A	7	1/30/2008	**1,700**	88.05
MW-3	9	3/23/2009	**1,700**	88.05
MW-5	7	1/31/2008	**1,700**	88.05
MW-5	16	9/13/2012	**1,700**	88.05
MW-6	9	3/23/2009	**1,700**	88.05
MW-6	13	3/22/2011	**1,700**	88.05
MW-2A	8	7/29/2008	**1,800**	90.71
MW-2A	10	9/23/2009	**1,800**	90.71
MW-2A	14	9/12/2011	**1,800**	90.71
MW-5	13	3/22/2011	**1,800**	90.71
MW-5	14	9/14/2011	**1,800**	90.71
MW-6	16	9/12/2012	**1,800**	90.71

Table 3
Dataset for Statistical Analysis - Dissolved Manganese
CCP Composites US LLC
North Kansas City, Missouri

Well ID	Round	Date	Value[1]	Cumulative Percentage
MW-6	12	9/14/2010	**1,840**	91.15
MW-3	12	9/15/2010	**1,960**	91.59
MW-5	12	9/14/2010	**1,970**	92.04
MW-10	13	3/23/2011	**2,000**	93.36
MW-3	7	1/31/2008	**2,000**	93.36
MW-3	14	9/12/2011	**2,000**	93.36
MW-2A	12	9/15/2010	**2,050**	93.81
MW-11	12	9/15/2010	**2,090**	94.25
MW-12	10	9/22/2009	**2,100**	94.69
MW-10	14	9/13/2011	**2,200**	95.13
MW-5	9	3/23/2009	**2,300**	95.58
MW-5	5	11/16/2006	**2,400**	96.02
MW-11	14	9/12/2011	**2,600**	96.46
MW-12	8	7/30/2008	**3,100**	96.90
MW-10	0	3/6/2003	**3,180**	97.35
MW-5	8	7/30/2008	**3,200**	98.23
MW-7	8	7/30/2008	**3,200**	98.23
MW-3	1	6/22/2004	**3,720**	98.67
MW-5	6	5/31/2007	**4,900**	99.12
MW-3	2	9/27/2004	**5,200**	99.56
MW-10	10	9/22/2009	**9,500**	100.00

Notes:

Shading = Value was included in the non-background dataset.

[1] = The value represents The concentration of dissolved arsenic as reported for Facility Monitoring wells. For duplicate sample pairs, the higher result was chosen to represent the value. For nondetect samples,one-half of the reporting limit was used as the value.

FIGURES

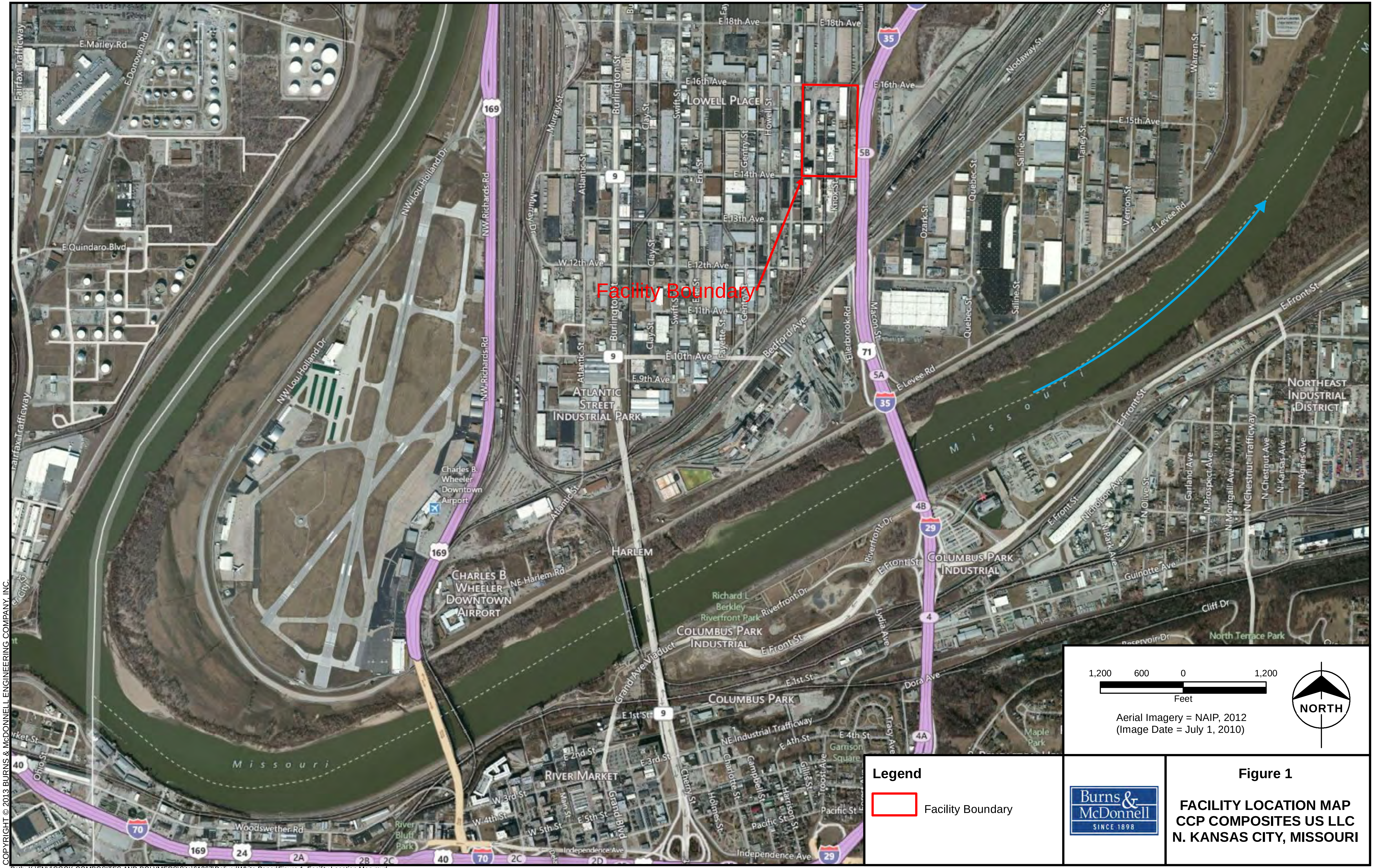

Figure 1

FACILITY LOCATION MAP
CCP COMPOSITES US LLC
N. KANSAS CITY, MISSOURI

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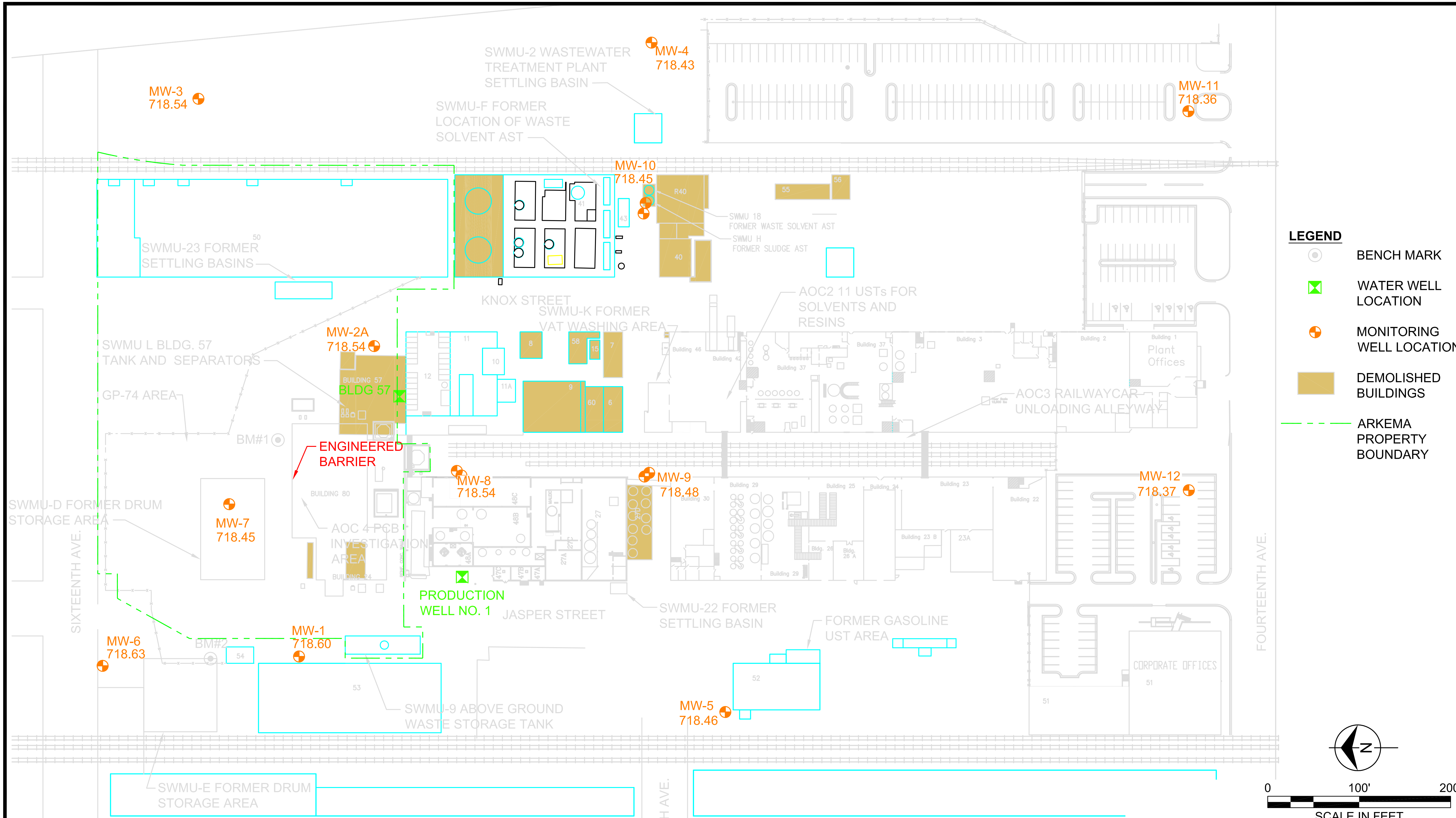

Burns & McDonnell SINCE 1898

Figure 2

SITE LAYOUT
CCP COMPOSITES US LLC
N. KANSAS CITY, MISSOURI

K:\ENV\COOK COMPOSITES AND POLYMERS\SITE\61367\DELIVER\WHITE PAPER\61367-SITE LAYOUT-FIG2.DWG 7/29/2013 10:15 AM BHOYE

ATTACHMENT A – HISTORIC PIEZOMETRIC SURFACE MAPS

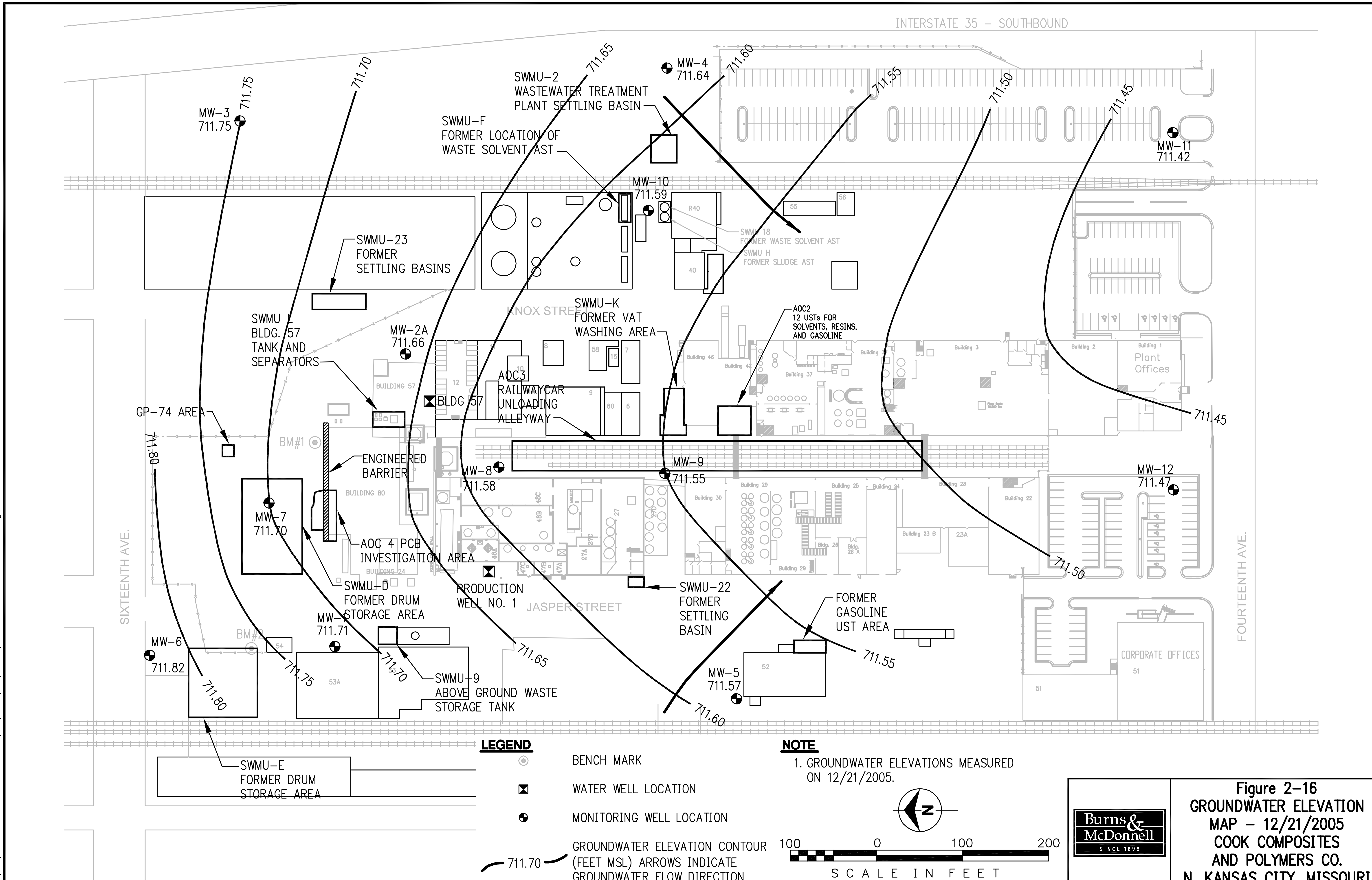

Figure 2-16
GROUNDWATER ELEVATION
MAP – 12/21/2005
COOK COMPOSITES
AND POLYMERS CO.
N. KANSAS CITY, MISSOURI

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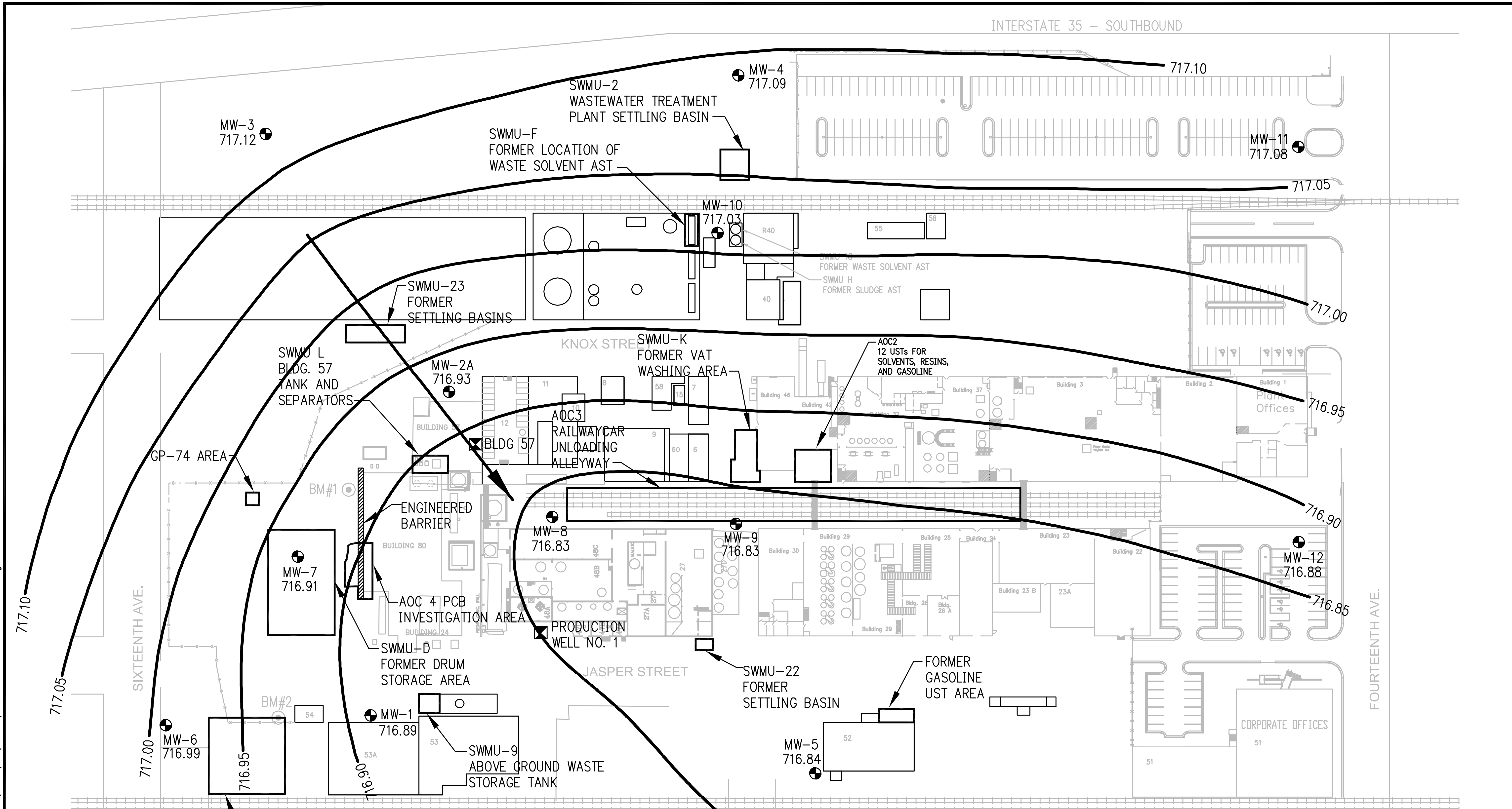

LEGEND

BENCH MARK

WATER WELL LOCATION

MONITORING WELL LOCATION

712.60 GROUNDWATER ELEVATION CONTOUR (FEET MSL) ARROWS INDICATE GROUNDWATER FLOW DIRECTION

NOTE

1. GROUNDWATER ELEVATIONS MEASURED ON 07/07/2005.

100 0 100 200

SCALE IN FEET

Burns & McDonnell
SINCE 1898

Figure 2–17
GROUNDWATER ELEVATION MAP – 07/07/2005
COOK COMPOSITES AND POLYMERS CO.
N. KANSAS CITY, MISSOURI

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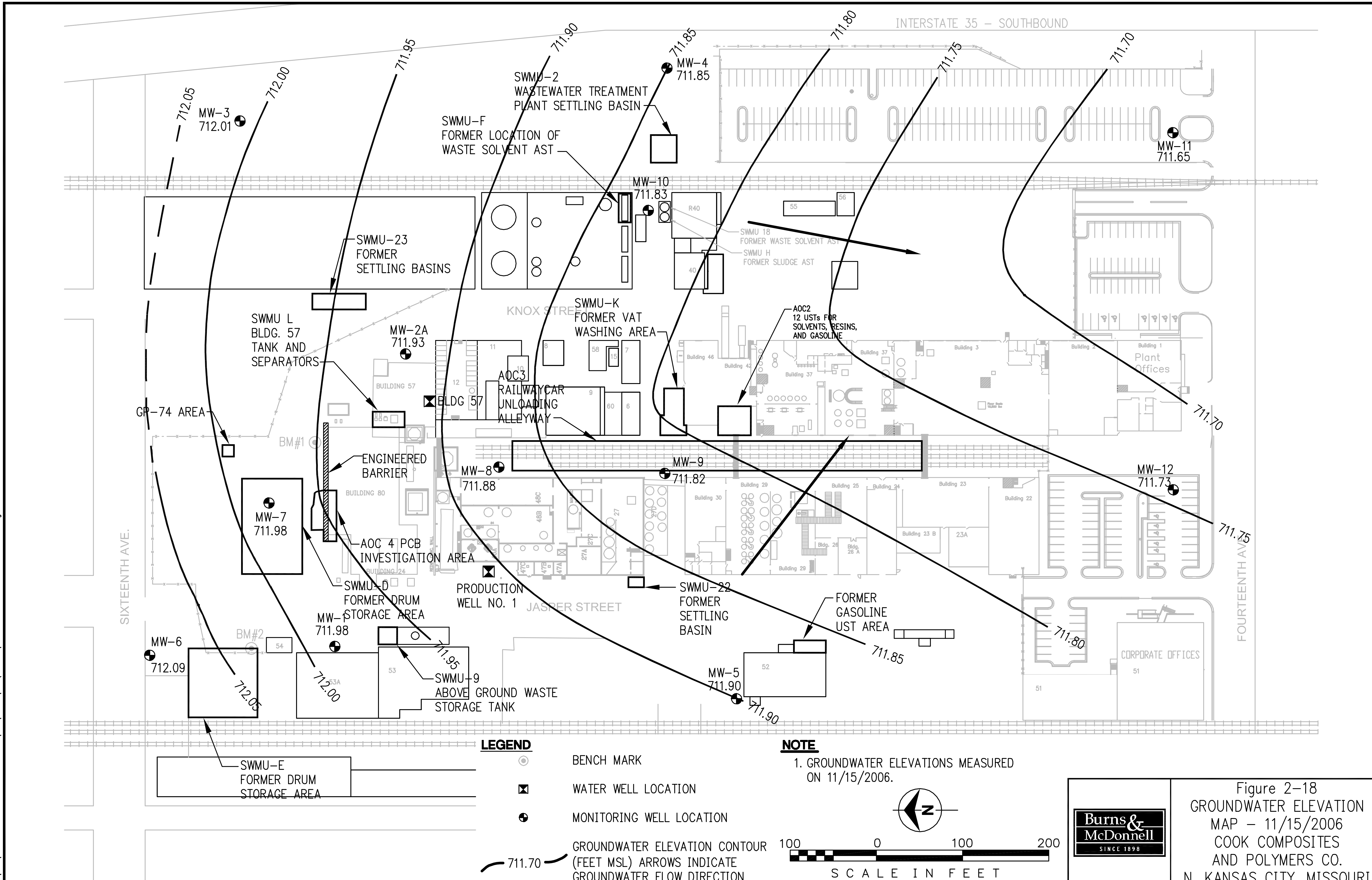

Figure 2-18
GROUNDWATER ELEVATION
MAP – 11/15/2006
COOK COMPOSITES
AND POLYMERS CO.
N. KANSAS CITY, MISSOURI

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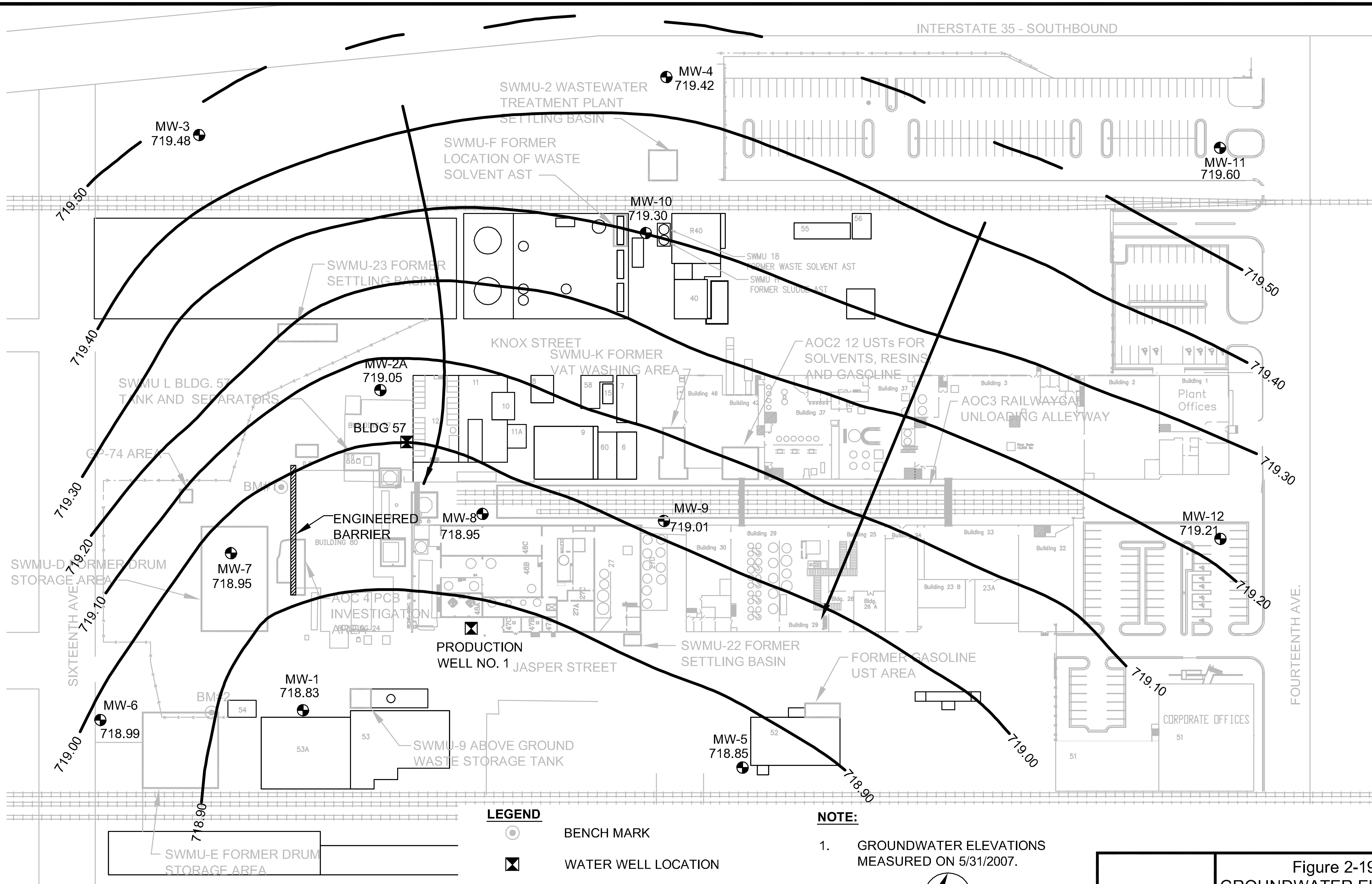

LEGEND

BENCH MARK

WATER WELL LOCATION

MONITORING WELL LOCATION

719.00

NOTE:

1. GROUNDWATER ELEVATIONS MEASURED ON 5/31/2007.

0 100' 200'

SCALE IN FEET

Burns & McDonnell SINCE 1898

Figure 2-19
GROUNDWATER ELEVATION MAP - 05/31/2007
COOK COMPOSITES AND POLYMERS CO.
N. KANSAS CITY, MISSOURI

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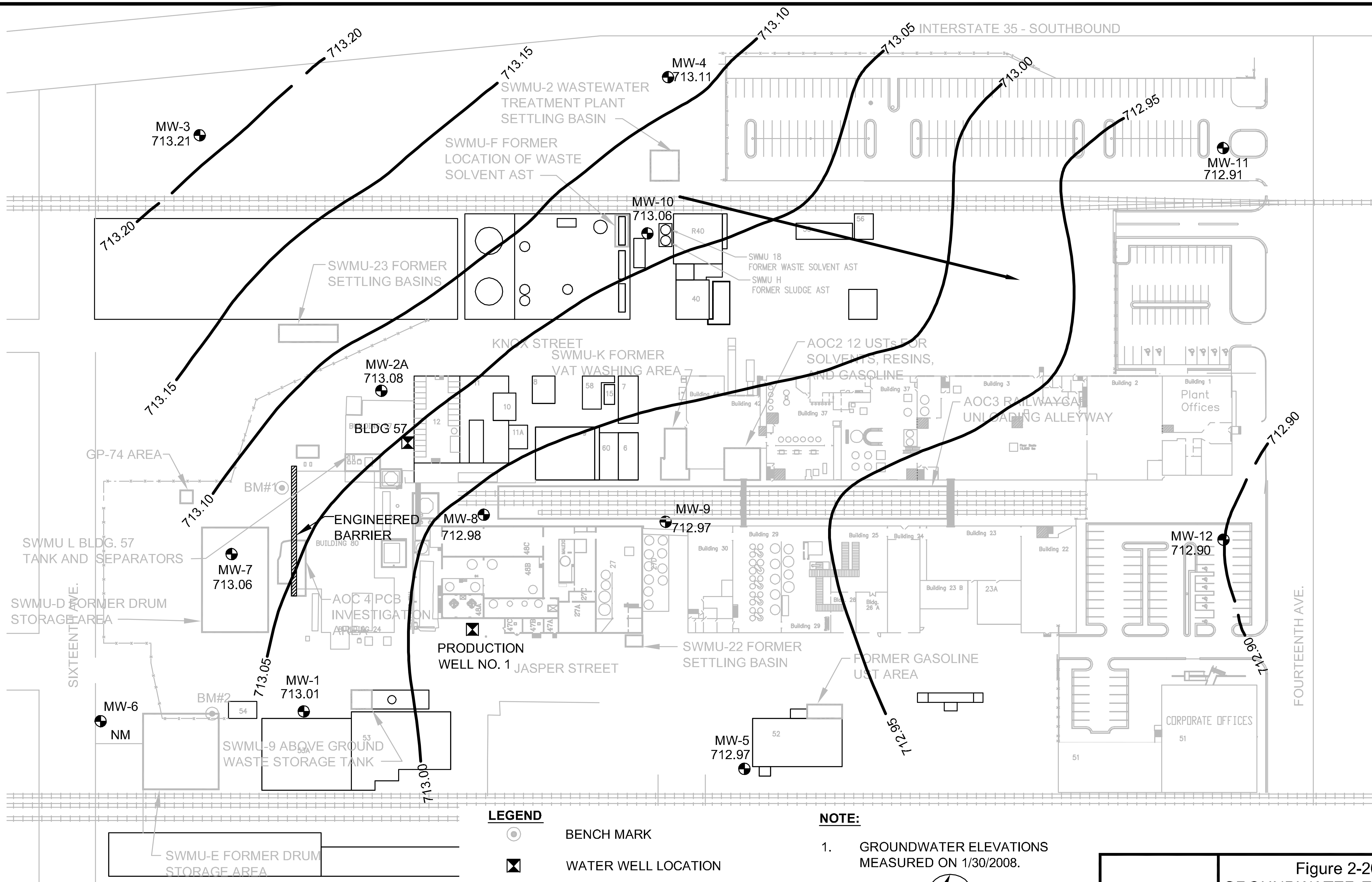

LEGEND

- BENCH MARK
- WATER WELL LOCATION
- MONITORING WELL LOCATION
- NM WATER LEVEL WAS NOT MEASURED

NOTE:

1. GROUNDWATER ELEVATIONS MEASURED ON 1/30/2008.

0 100' 200'

SCALE IN FEET

Burns & McDonnell SINCE 1898

Figure 2-20
GROUNDWATER ELEVATION MAP - JANUARY 2008
COOK COMPOSITES AND POLYMERS CO.
N. KANSAS CITY, MISSOURI

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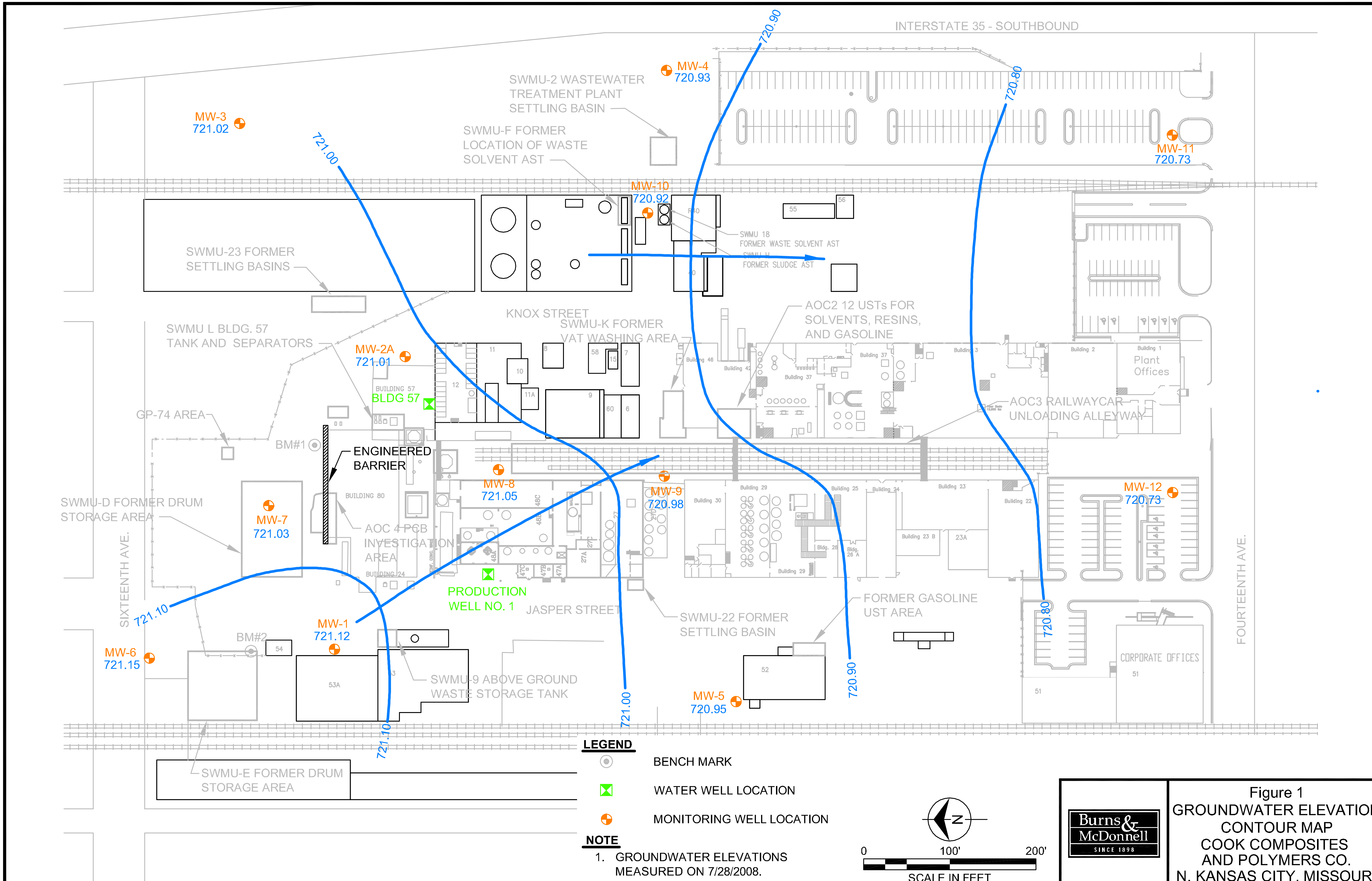

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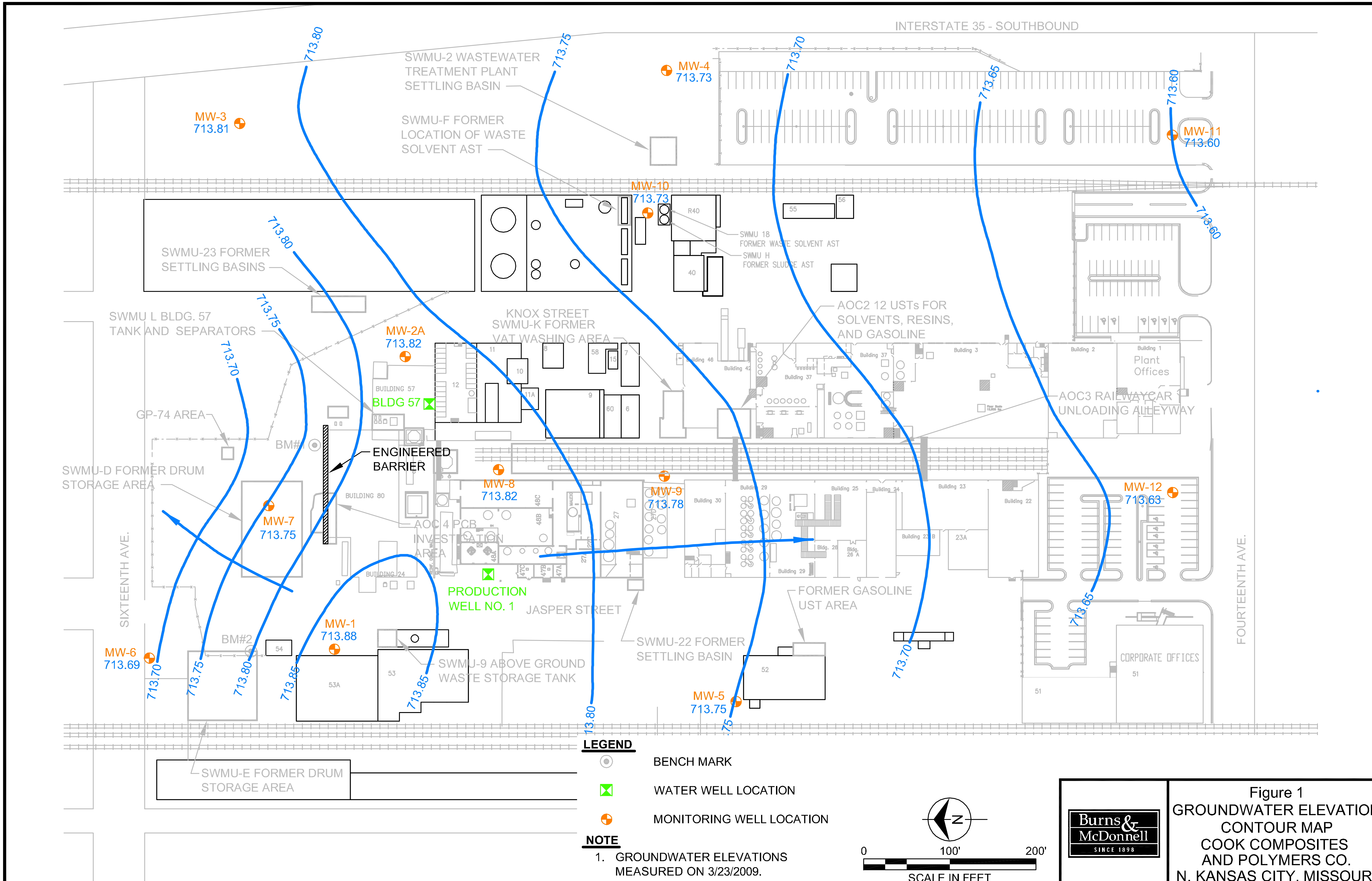

Figure 1
GROUNDWATER ELEVATION CONTOUR MAP
COOK COMPOSITES AND POLYMERS CO.
N. KANSAS CITY, MISSOURI

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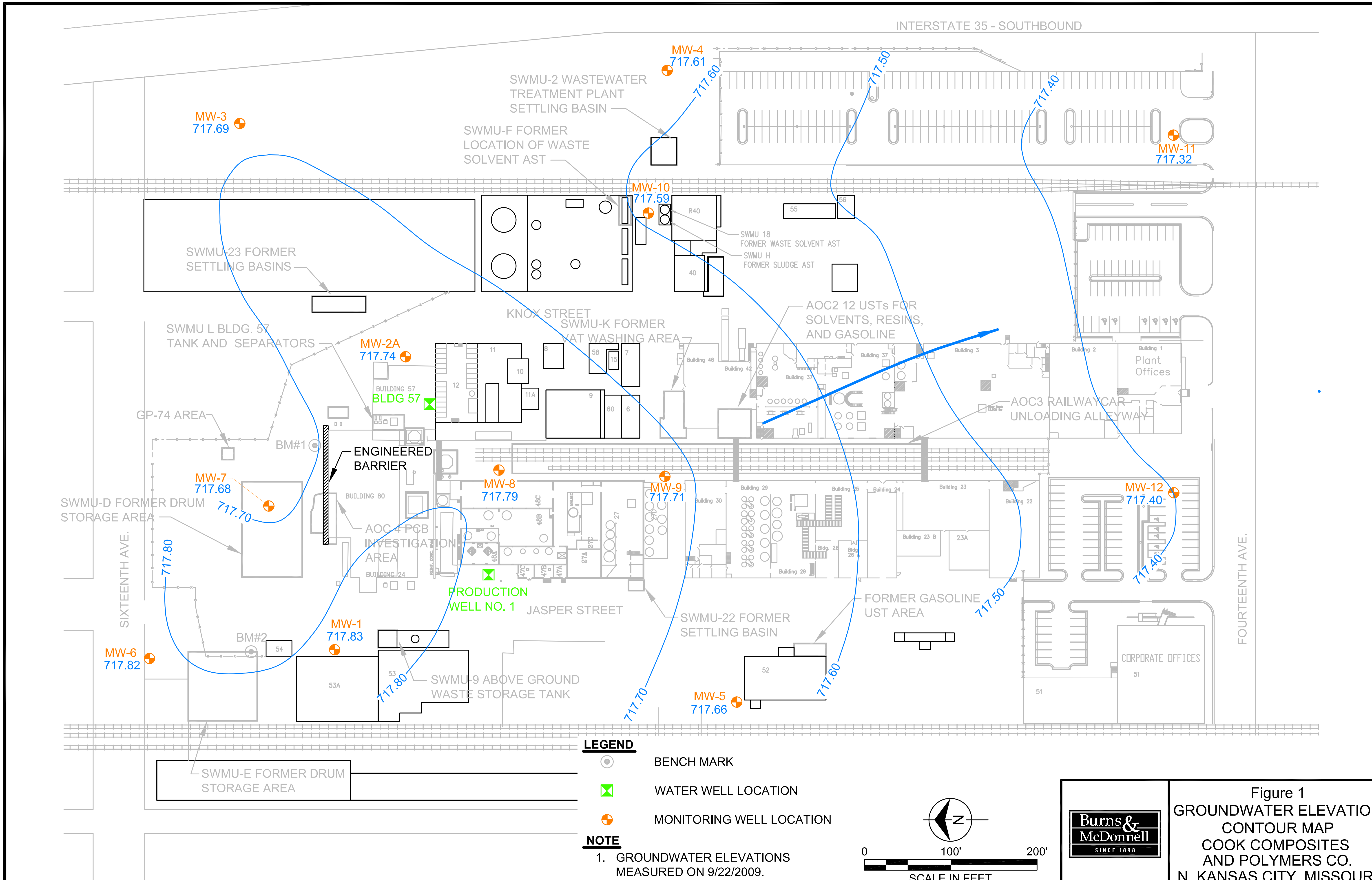

Figure 1
GROUNDWATER ELEVATION
CONTOUR MAP
COOK COMPOSITES
AND POLYMERS CO.
N. KANSAS CITY, MISSOURI

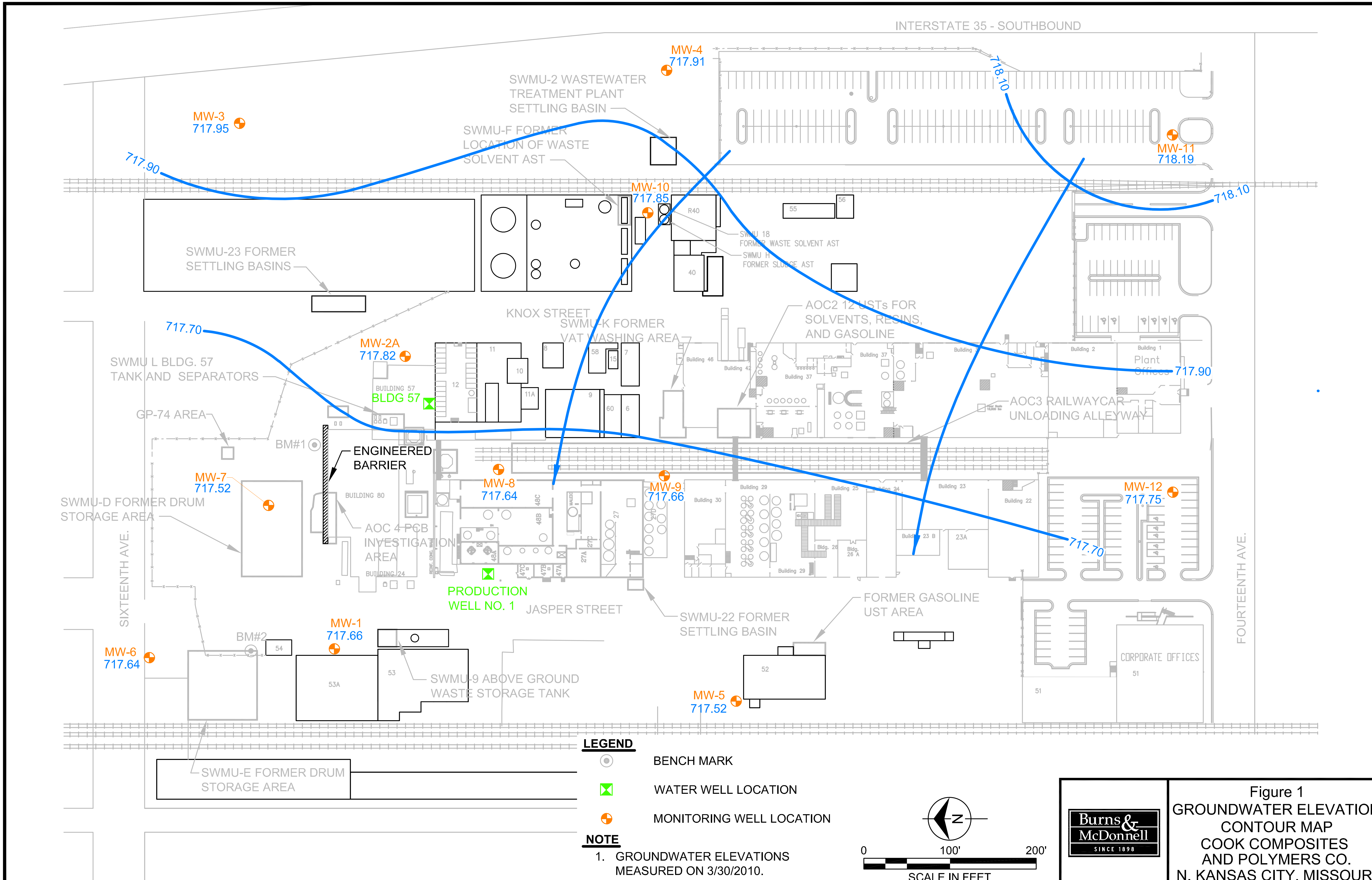

Figure 1
GROUNDWATER ELEVATION
CONTOUR MAP
COOK COMPOSITES
AND POLYMERS CO.
N. KANSAS CITY, MISSOURI

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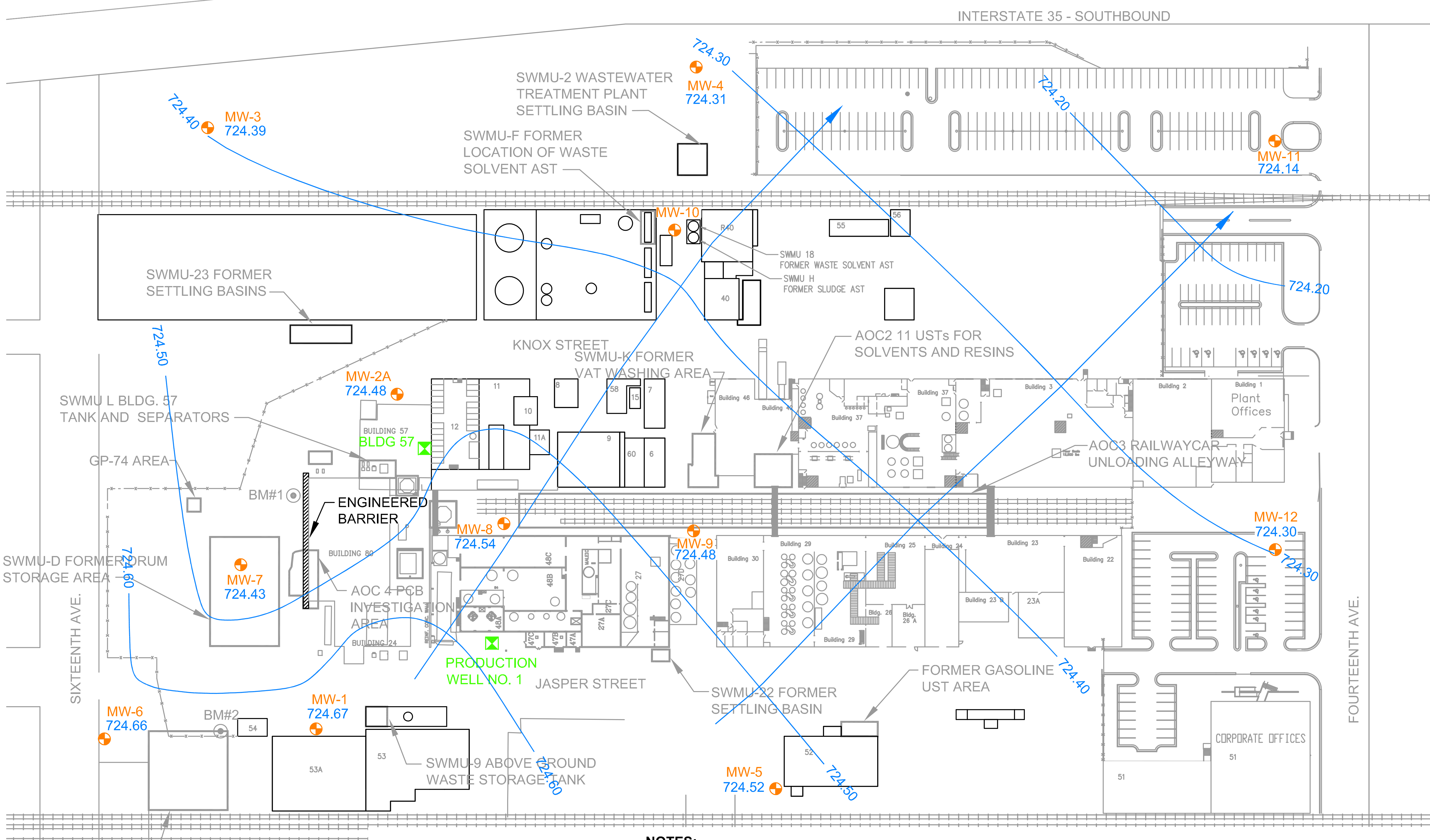


LEGEND

BENCH MARK

WATER WELL LOCATION

MONITORING WELL LOCATION

NOTES:

1. GROUNDWATER ELEVATIONS MEASURED ON 9/14/2010.
2. DUE TO THE PRESENCE OF LIGHT NONAQUEOUS PHASE LIQUID, GROUNDWATER ELEVATION DATA FOR MONITORING WELL MW-10 WAS NOT USED IN DEVELOPING THE CONTOUS.

0 100' 200'

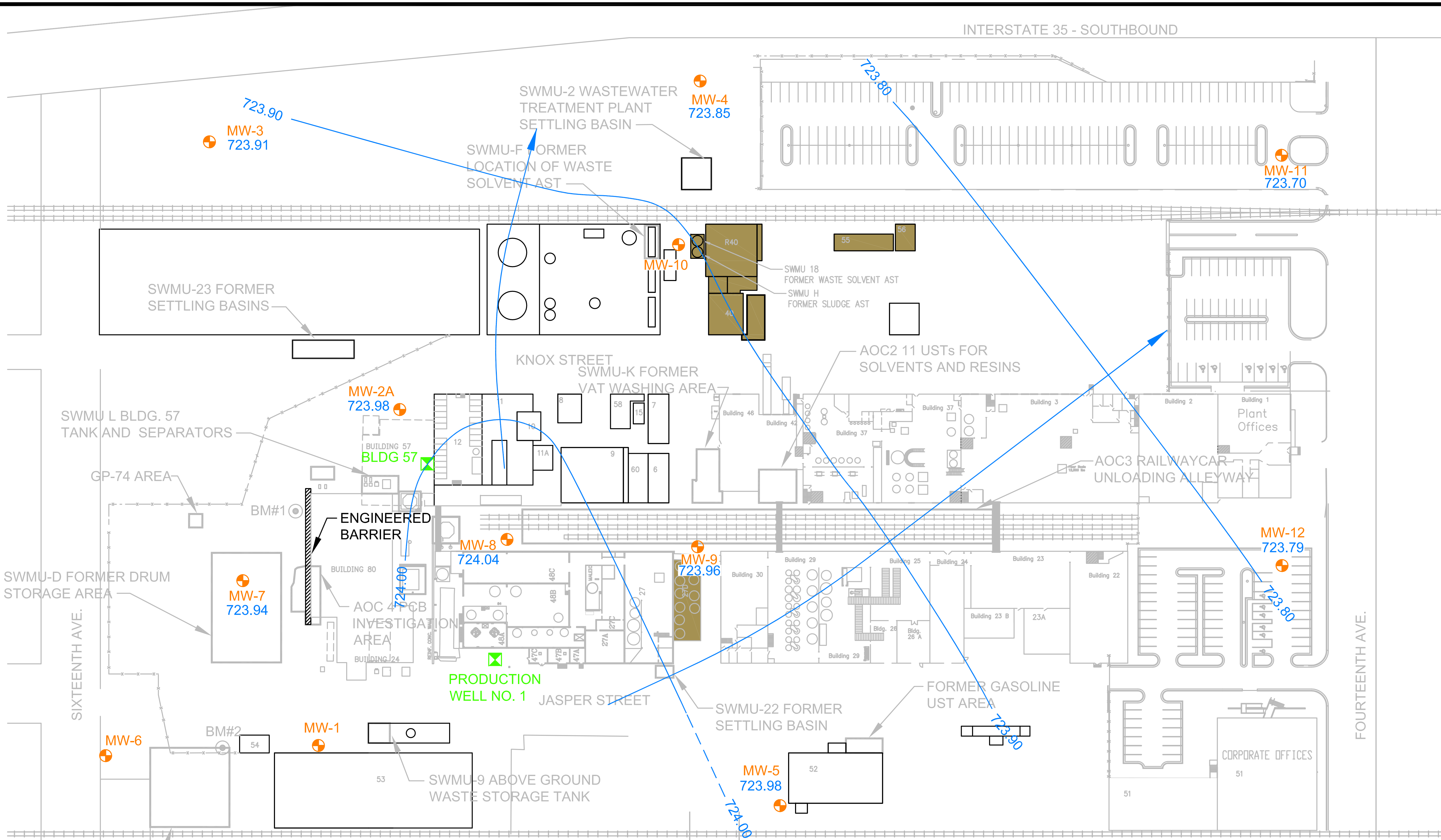
SCALE IN FEET

N

Burns & McDonnell SINCE 1898

Figure 1
GROUNDWATER ELEVATION CONTOUR MAP
COOK COMPOSITES AND POLYMERS CO.
N. KANSAS CITY, MISSOURI

K:\ENV\COOK COMPOSITES AND POLYMERS\SITE\56016\CAD\CCP-GW-CONTOUR-SEP2010-FG1.DWG 11-12-2010 8:24 OSHELDON



LEGEND

- BENCH MARK
- WATER WELL LOCATION
- MONITORING WELL LOCATION
- DEMOLISHED BUILDING

NOTES:

1. GROUNDWATER ELEVATIONS MEASURED ON 10/15/2010.
2. DUE TO THE PRESENCE OF LIGHT NONAQUEOUS PHASE LIQUID, GROUNDWATER ELEVATION DATA FOR MONITORING WELL MW-10 WAS NOT USED IN DEVELOPING THE CONTOURS.

Burns & McDonnell SINCE 1898

Figure 1
GROUNDWATER ELEVATION CONTOUR MAP - 10/15/2010
COOK COMPOSITES AND POLYMERS CO.
N. KANSAS CITY, MISSOURI

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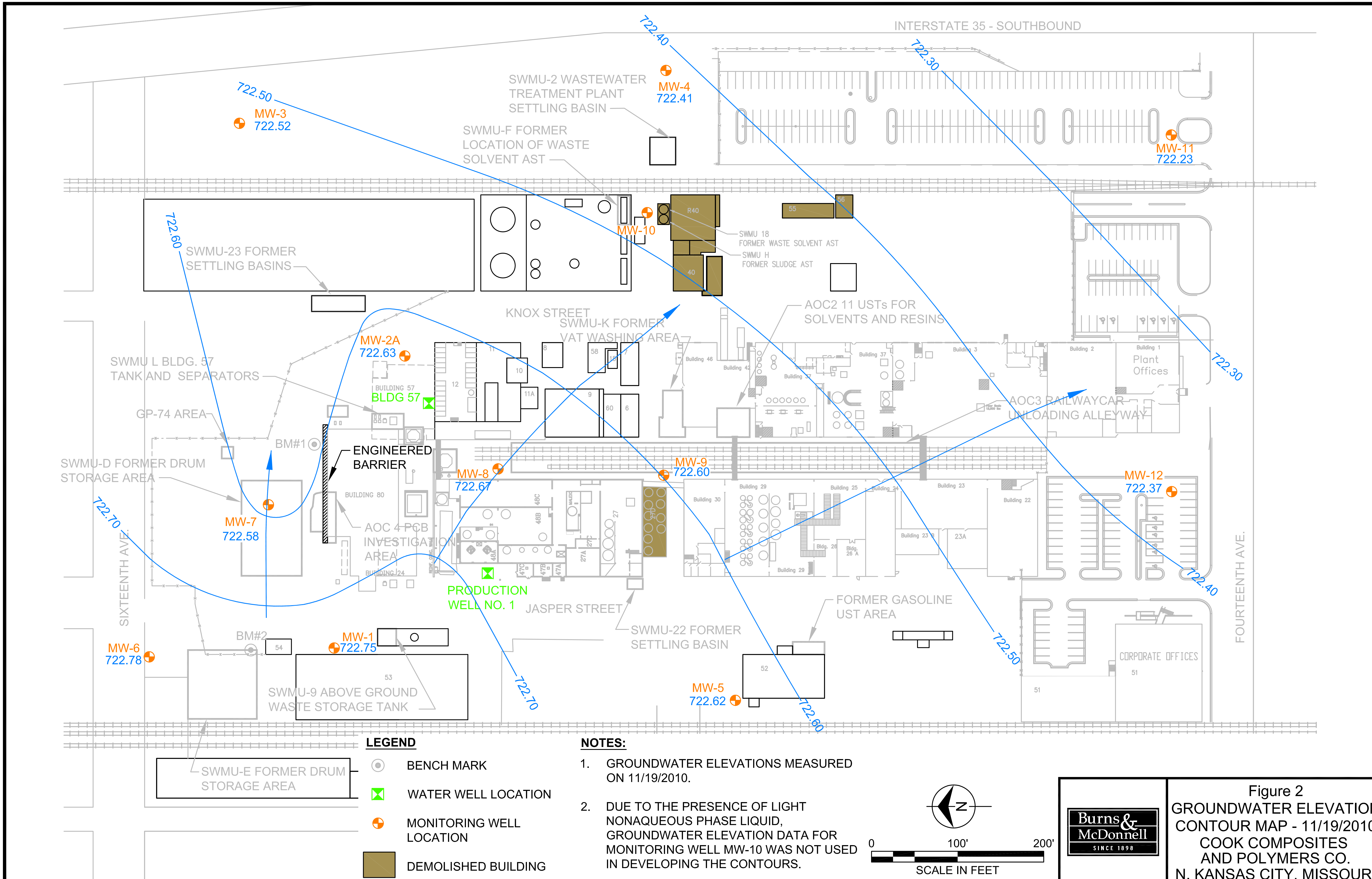

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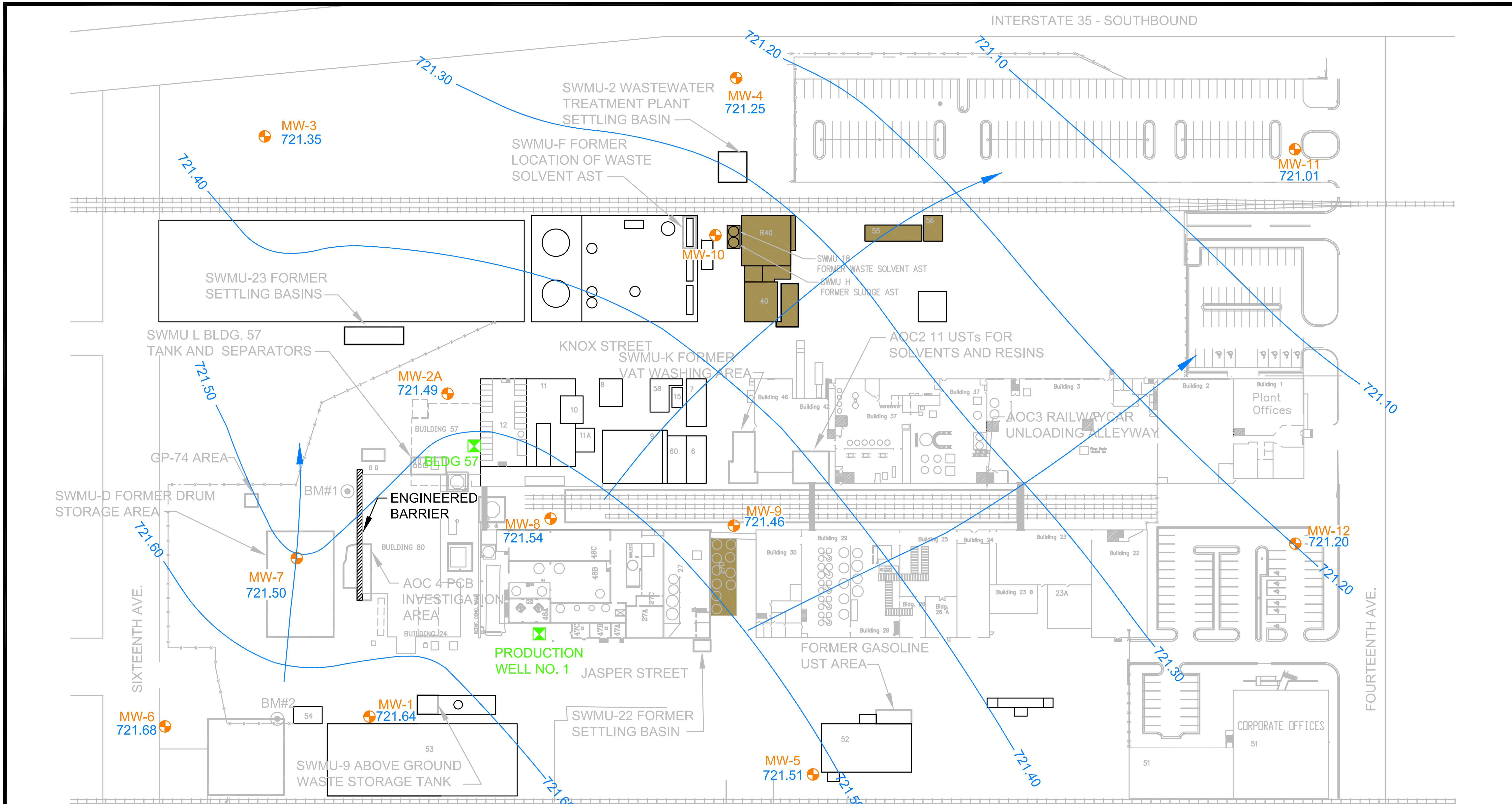

SWMU-E FORMER DRUM STORAGE AREA

LEGEND

BENCH MARK

WATER WELL LOCATION

MONITORING WELL LOCATION

DEMOLISHED BUILDING

NOTES:

1. GROUNDWATER ELEVATIONS MEASURED ON 12/15/2010.
2. DUE TO THE PRESENCE OF LIGHT NONAQUEOUS PHASE LIQUID, GROUNDWATER ELEVATION DATA FOR MONITORING WELL MW-10 WAS NOT USED IN DEVELOPING THE CONTOURS.

N

0 100' 200'

SCALE IN FEET

Burns & McDonnell SINCE 1898

Figure 3
GROUNDWATER ELEVATION CONTOUR MAP - 12/15/2010
COOK COMPOSITES AND POLYMERS CO.
N. KANSAS CITY, MISSOURI

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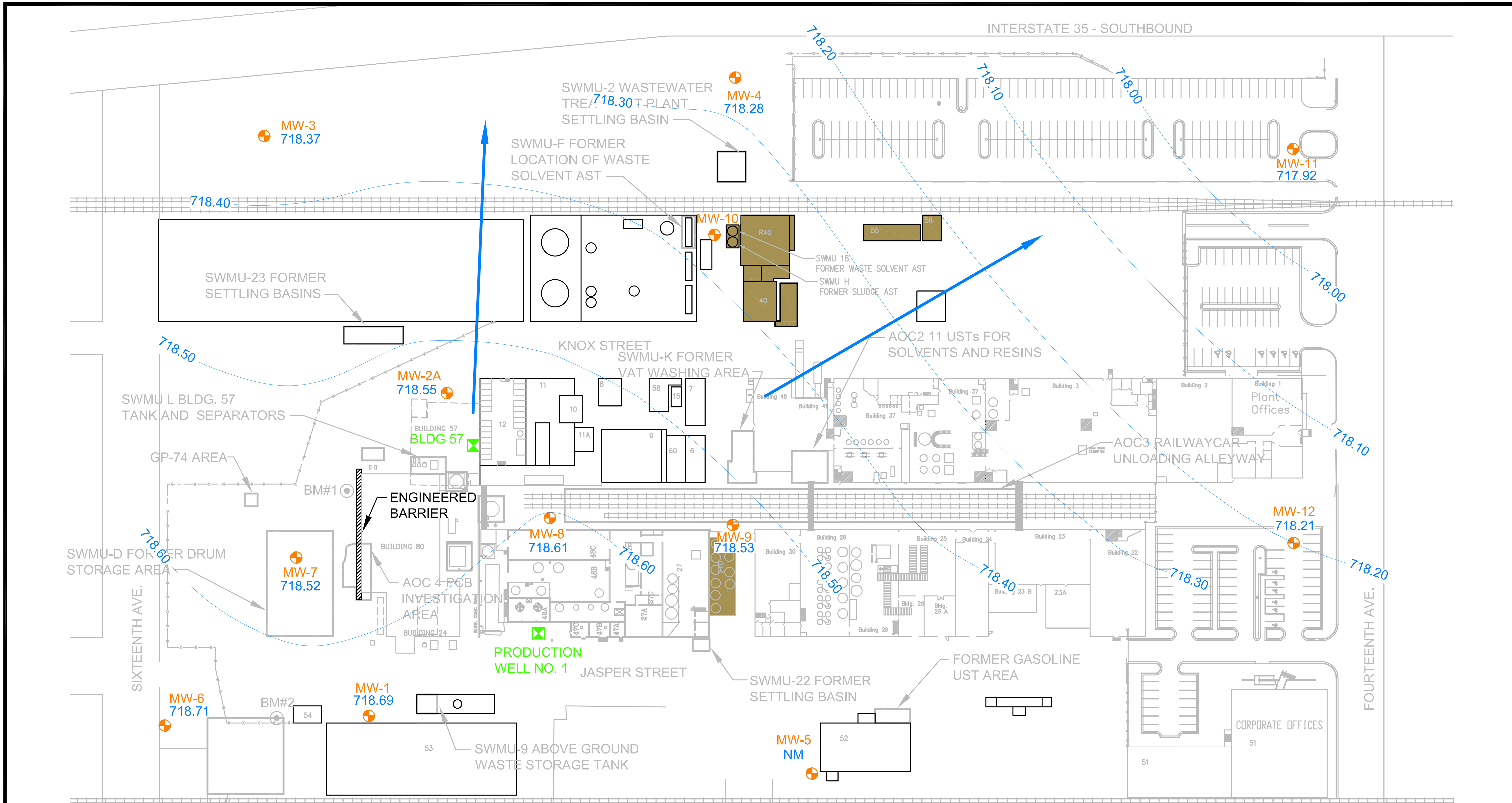

LEGEND

BENCH MARK

WATER WELL LOCATION

MONITORING WELL LOCATION

DEMOLISHED BUILDING

NOTES:

1. GROUNDWATER ELEVATIONS MEASURED ON 01/21/2011.
2. DUE TO THE PRESENCE OF LIGHT NONAQUEOUS PHASE LIQUID, GROUNDWATER ELEVATION DATA FOR MONITORING WELL MW-10 WAS NOT USED IN DEVELOPING THE CONTOURS.

Burns & McDonnell SINCE 1898

Figure 1
GROUNDWATER ELEVATION CONTOUR MAP - 01/21/2011
COOK COMPOSITES AND POLYMERS CO.
N. KANSAS CITY, MISSOURI

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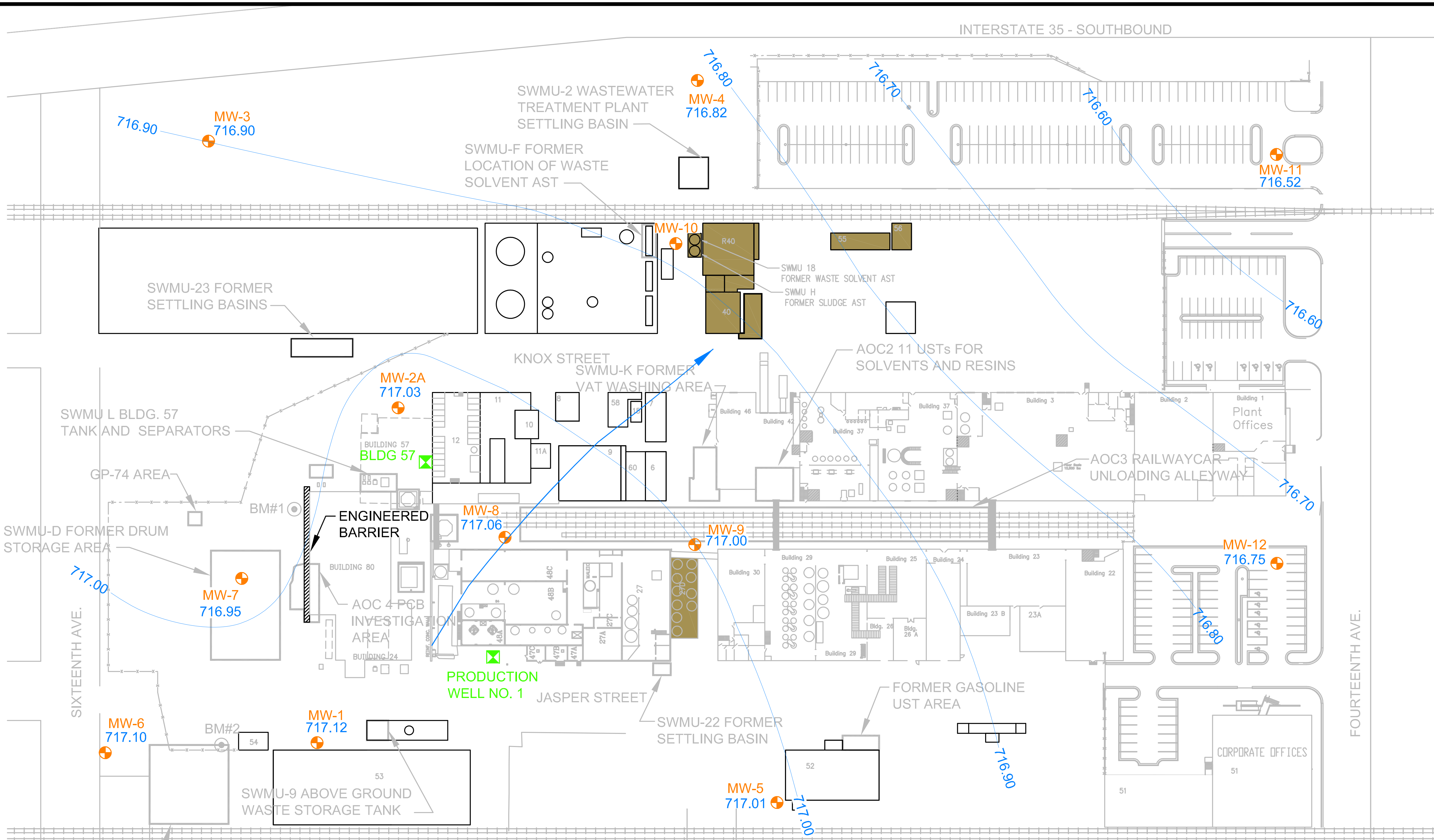


LEGEND

BENCH MARK

WATER WELL LOCATION

MONITORING WELL LOCATION

DEMOLISHED BUILDING

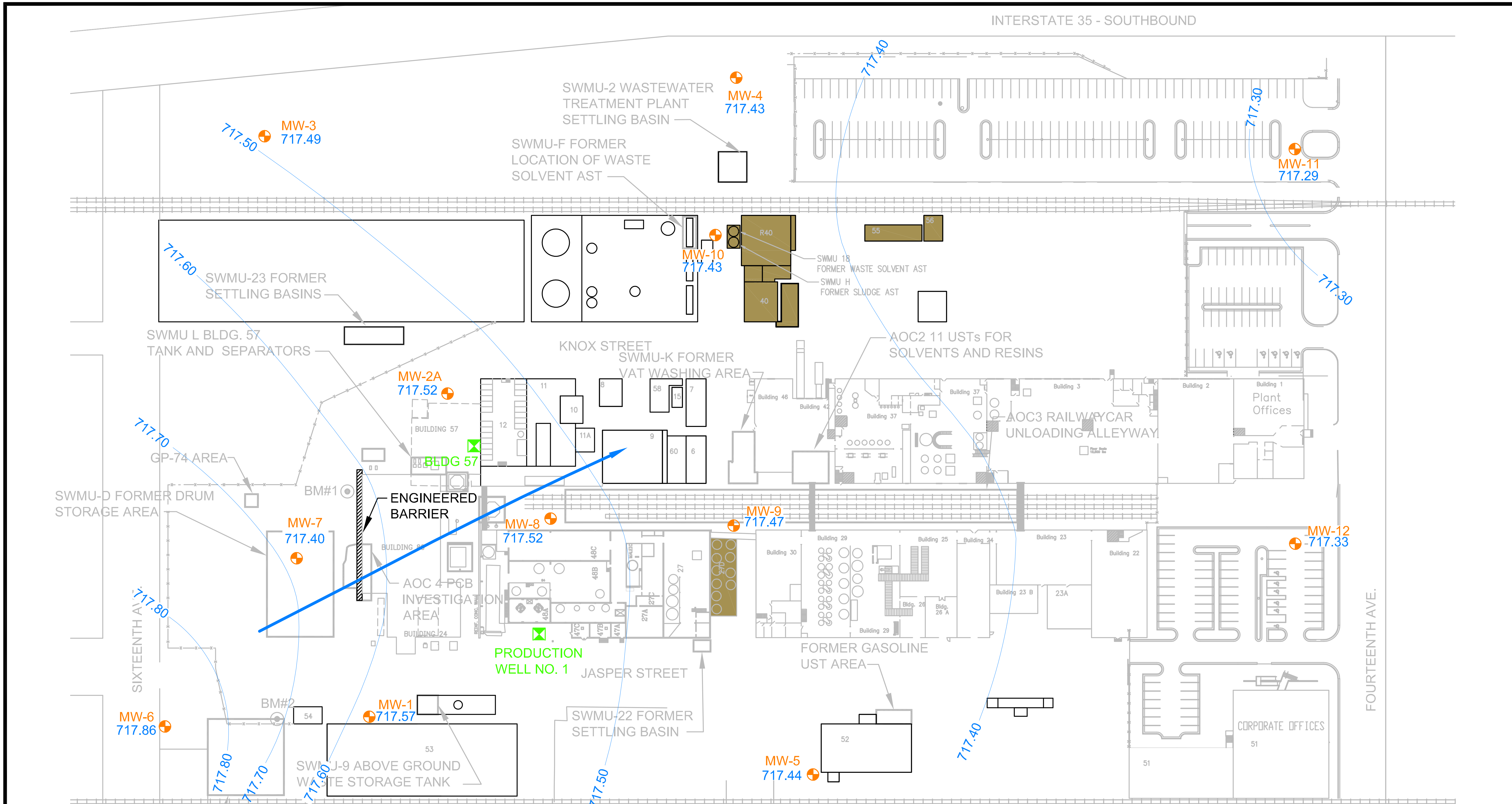
NOTES:

1. GROUNDWATER ELEVATIONS MEASURED ON 02/17/2011.
2. DUE TO THE PRESENCE OF LIGHT NONAQUEOUS PHASE LIQUID, GROUNDWATER ELEVATION DATA FOR MONITORING WELL MW-10 WAS NOT USED IN DEVELOPING THE CONTOURS.

Burns & McDonnell SINCE 1898

Figure 2
GROUNDWATER ELEVATION CONTOUR MAP - 02/17/2011
COOK COMPOSITES AND POLYMERS CO.
N. KANSAS CITY, MISSOURI

K:\ENV\COOK COMPOSITES AND POLYMERS\SITE\60920\CAD\JAN 2011\CCP-GW-CONTOUR-FEB 2011-FG2.DWG 04-26-2011 10:35 RPHILLIPS



LEGEND

- BENCH MARK
- WATER WELL LOCATION
- MONITORING WELL LOCATION
- DEMOLISHED BUILDING

NOTES:

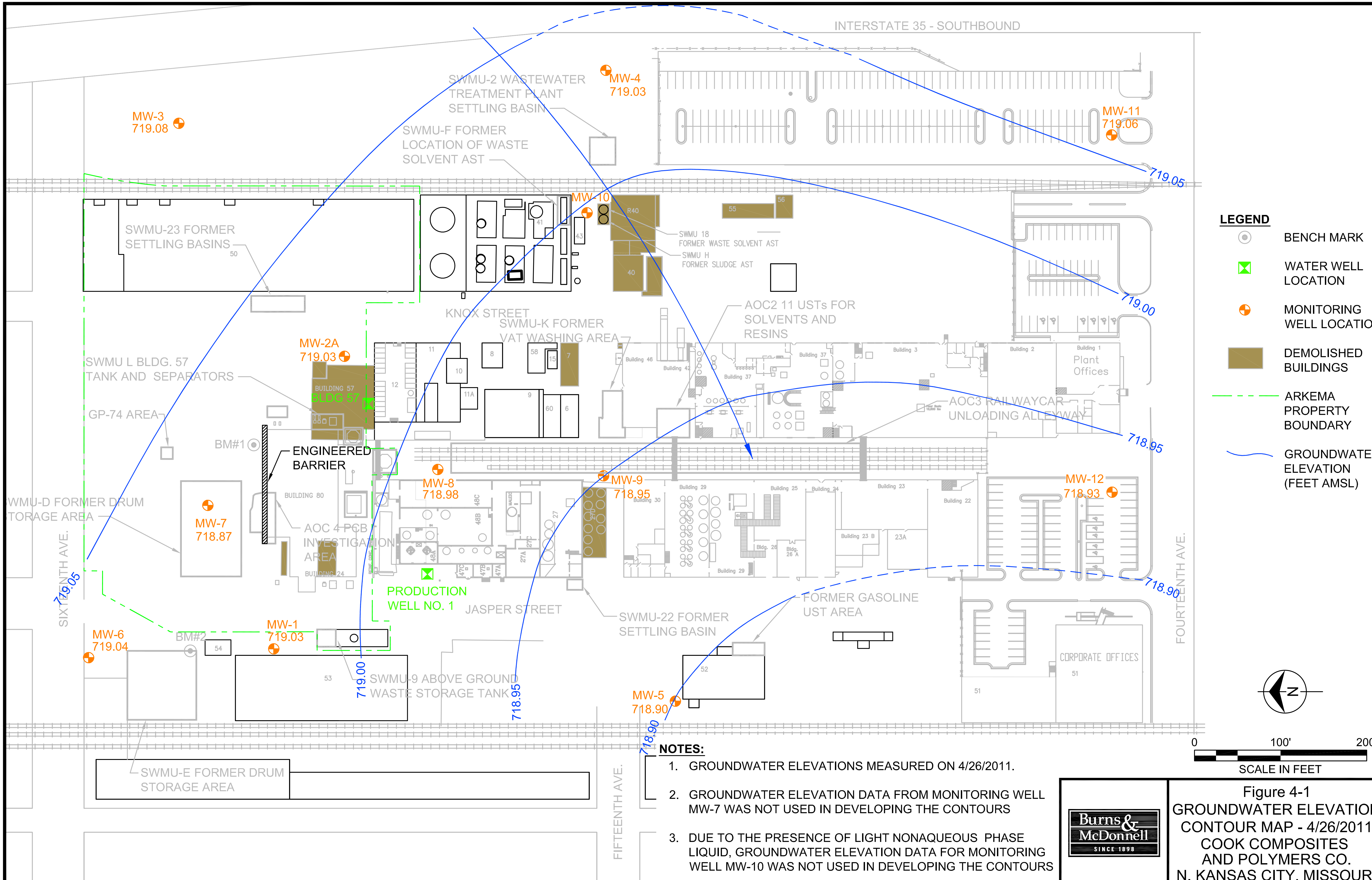
1. GROUNDWATER ELEVATIONS MEASURED ON 03/22/2011.

0 100' 200'
SCALE IN FEET

Burns & McDonnell
SINCE 1898

Figure 3
GROUNDWATER ELEVATION CONTOUR MAP - 03/22/2011
COOK COMPOSITES AND POLYMERS CO.
N. KANSAS CITY, MISSOURI

K:\ENV\COOK COMPOSITES AND POLYMERS\SITE\60920\CAD\JAN 2011\CCP-GW-CONTOUR- MAR 2011-FG3.DWG 04-26-2011 10:33 RPHILLIPS



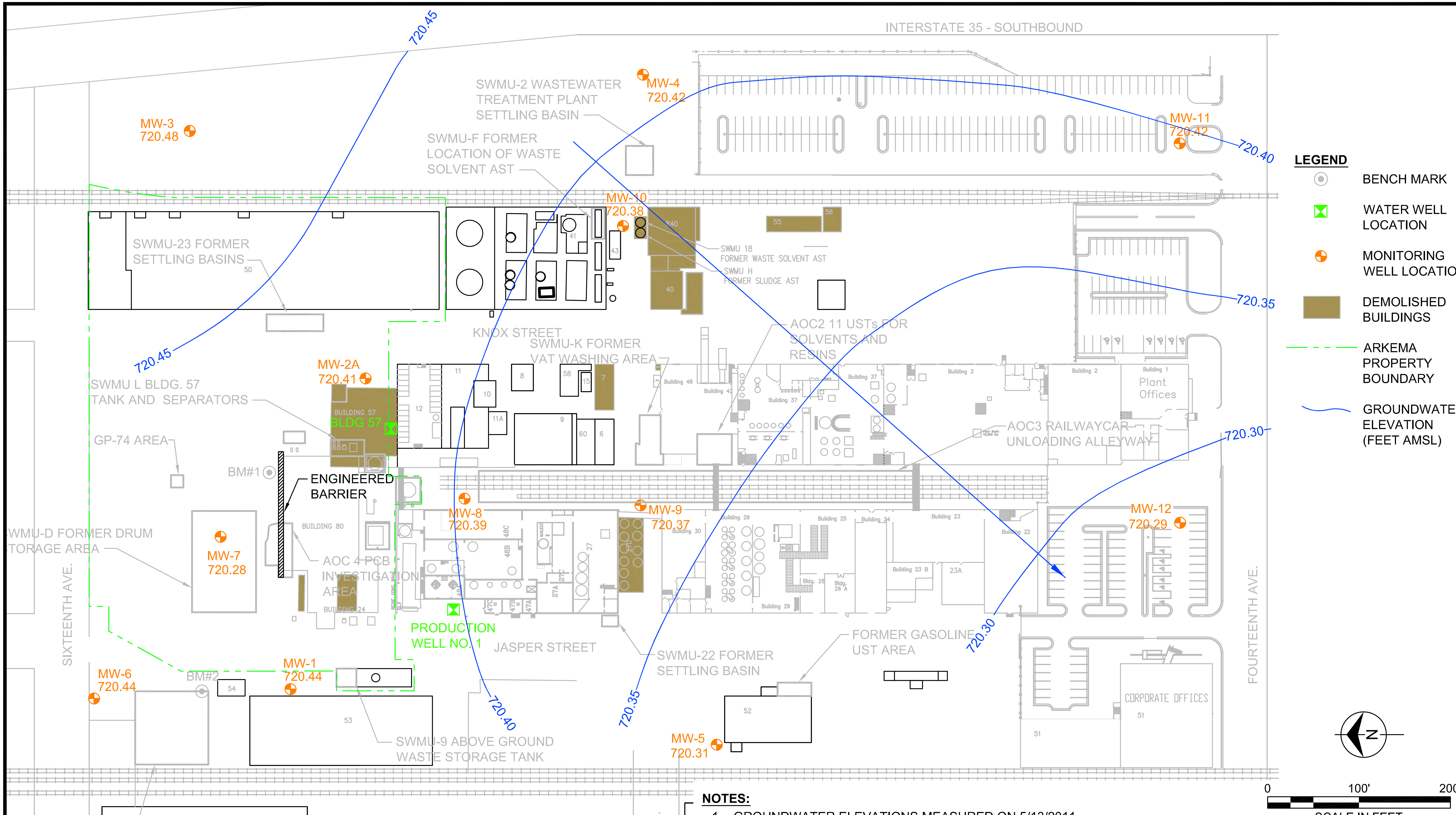
NOTES:

1. GROUNDWATER ELEVATIONS MEASURED ON 4/26/2011.
2. GROUNDWATER ELEVATION DATA FROM MONITORING WELL MW-7 WAS NOT USED IN DEVELOPING THE CONTOURS
3. DUE TO THE PRESENCE OF LIGHT NONAQUEOUS PHASE LIQUID, GROUNDWATER ELEVATION DATA FOR MONITORING WELL MW-10 WAS NOT USED IN DEVELOPING THE CONTOURS

Burns & McDonnell SINCE 1898

Figure 4-1
GROUNDWATER ELEVATION CONTOUR MAP - 4/26/2011
COOK COMPOSITES AND POLYMERS CO.
N. KANSAS CITY, MISSOURI

K:\ENV\COOK COMPOSITES AND POLYMERS\SITE\60920\CAD\SEPT 2011\60920-GROUNDWATER-ELEV-FIG4-1.DWG 10/20/2011 2:16 PM CBANKS



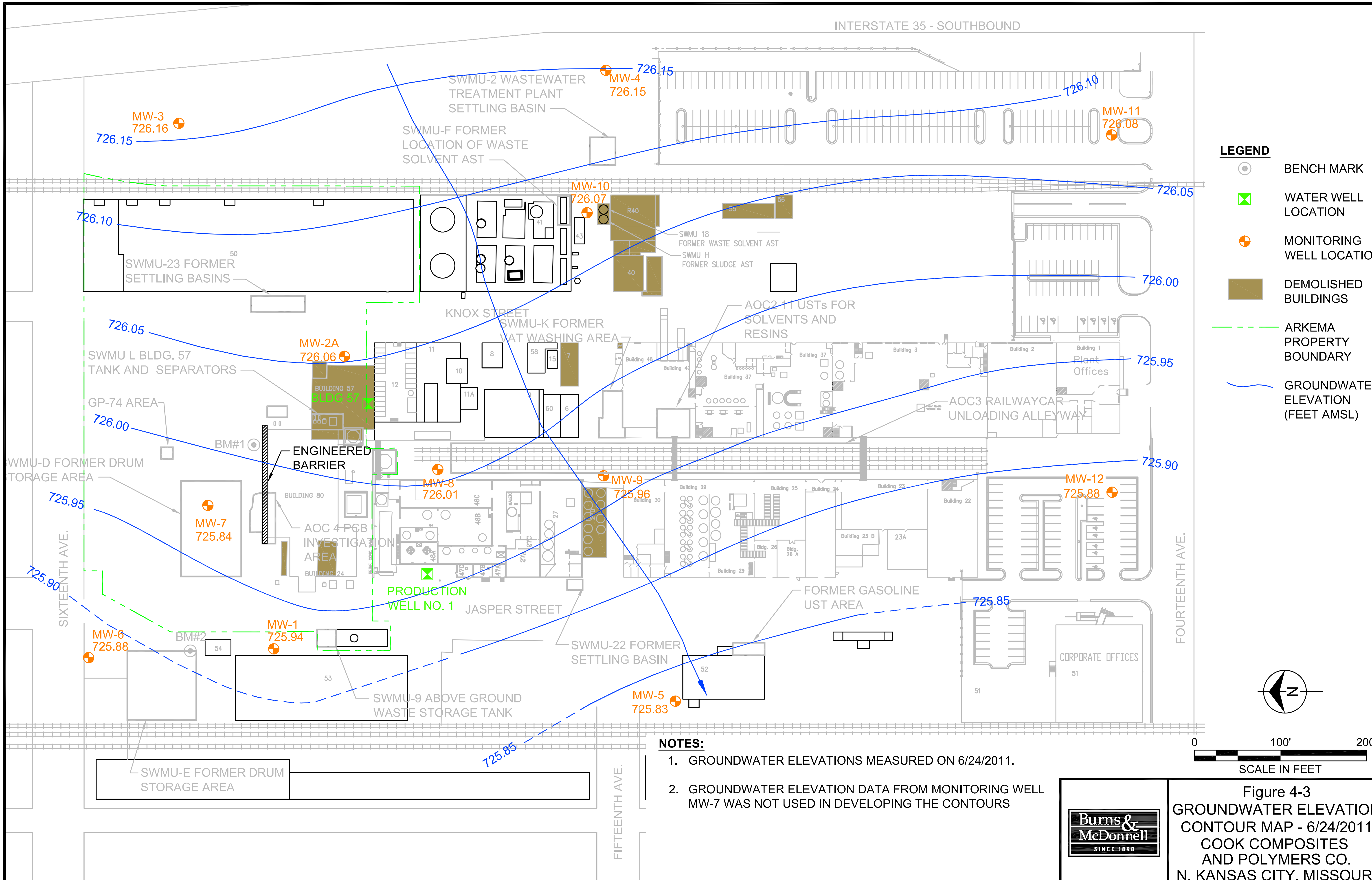
NOTES:

1. GROUNDWATER ELEVATIONS MEASURED ON 5/13/2011.
2. GROUNDWATER ELEVATION DATA FROM MONITORING WELL MW-7 WAS NOT USED IN DEVELOPING THE CONTOURS

Burns & McDonnell SINCE 1898

Figure 4-2
GROUNDWATER ELEVATION CONTOUR MAP - 5/13/2011
COOK COMPOSITES AND POLYMERS CO.
N. KANSAS CITY, MISSOURI

K:\ENV\COOK COMPOSITES AND POLYMERS\SITE\60920\CAD\SEPT 2011\60920-GROUNDWATER-ELEV-FIG4-2.DWG 10/20/2011 1:11 PM CBANKS



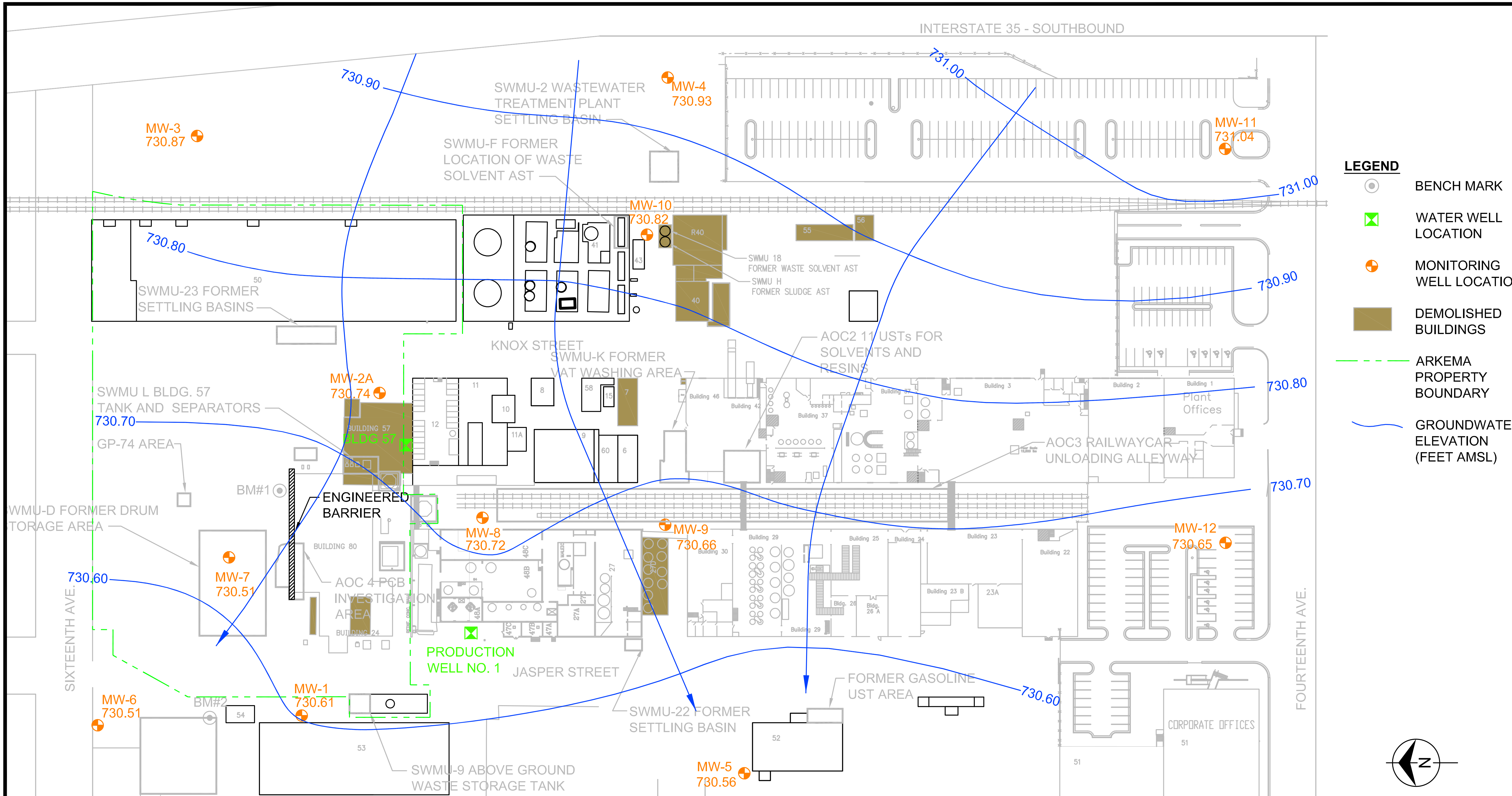
NOTES:

1. GROUNDWATER ELEVATIONS MEASURED ON 6/24/2011.
2. GROUNDWATER ELEVATION DATA FROM MONITORING WELL MW-7 WAS NOT USED IN DEVELOPING THE CONTOURS

Burns & McDonnell SINCE 1898

Figure 4-3
GROUNDWATER ELEVATION CONTOUR MAP - 6/24/2011
COOK COMPOSITES AND POLYMERS CO.
N. KANSAS CITY, MISSOURI

K:\ENV\COOK COMPOSITES AND POLYMERS\SITE\60920\CAD\SEPT 2011\60920-GROUNDWATER-ELEV-FIG4-3.DWG 10/20/2011 2:15 PM CBANKS



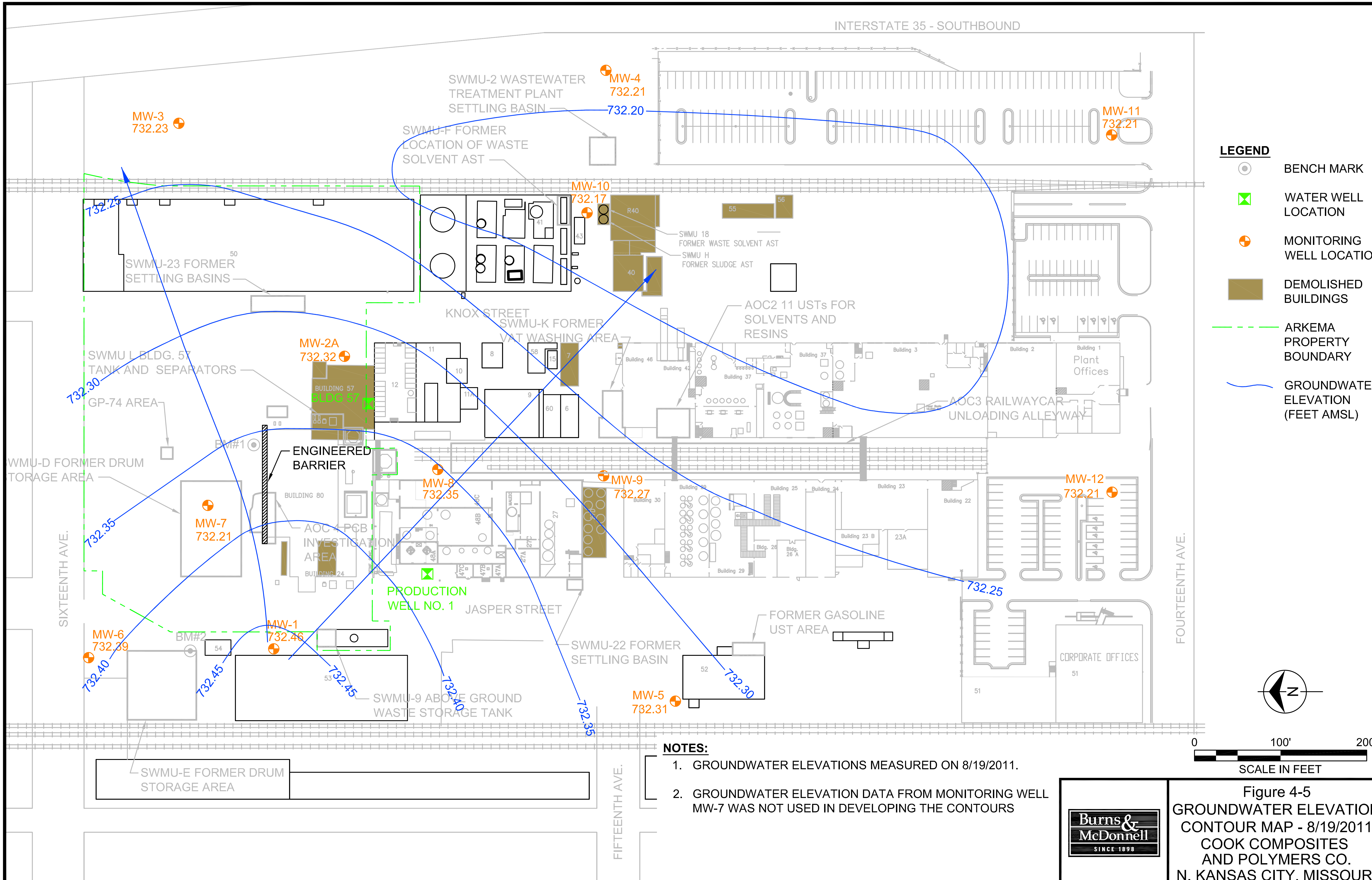
NOTES:

1. GROUNDWATER ELEVATIONS MEASURED ON 7/14/2011.
2. GROUNDWATER ELEVATION DATA FROM MONITORING WELL MW-7 WAS NOT USED IN DEVELOPING THE CONTOURS

Burns & McDonnell SINCE 1898

Figure 4-4
GROUNDWATER ELEVATION CONTOUR MAP - 7/14/2011
COOK COMPOSITES AND POLYMERS CO.
N. KANSAS CITY, MISSOURI

K:\ENV\COOK COMPOSITES AND POLYMERS\SITE\60920\CAD\SEPT 2011\60920-GROUNDWATER-ELEV-FIG4-4.DWG 10/20/2011 1:37 PM CBANKS



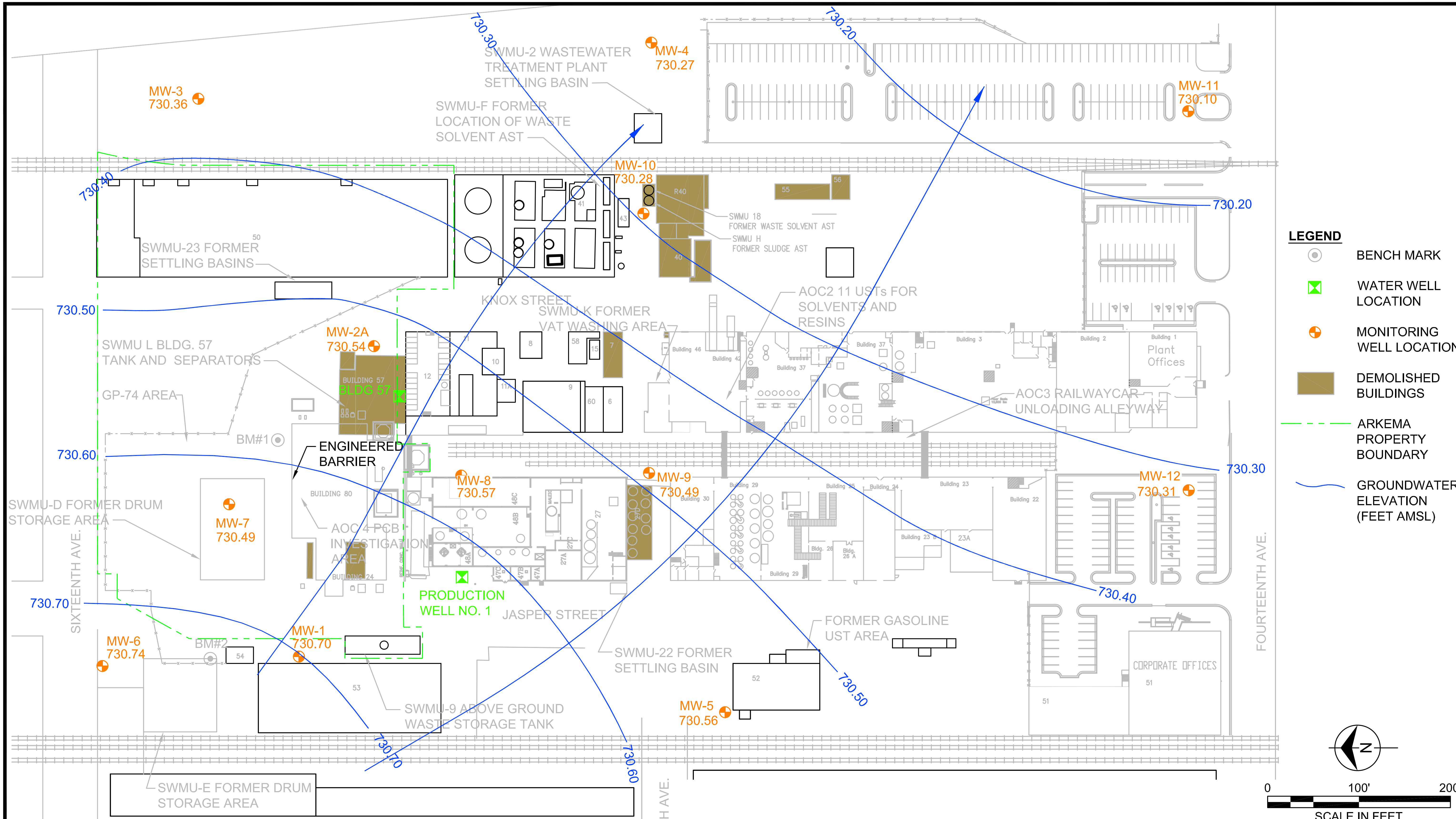
NOTES:

1. GROUNDWATER ELEVATIONS MEASURED ON 8/19/2011.
2. GROUNDWATER ELEVATION DATA FROM MONITORING WELL MW-7 WAS NOT USED IN DEVELOPING THE CONTOURS

Burns & McDonnell SINCE 1898

Figure 4-5
GROUNDWATER ELEVATION CONTOUR MAP - 8/19/2011
COOK COMPOSITES AND POLYMERS CO.
N. KANSAS CITY, MISSOURI

K:\ENV\COOK COMPOSITES AND POLYMERS\SITE\60920\CAD\SEPT 2011\60920-GROUNDWATER-ELEV-FIG4-5.DWG 10/20/2011 1:48 PM CBANKS



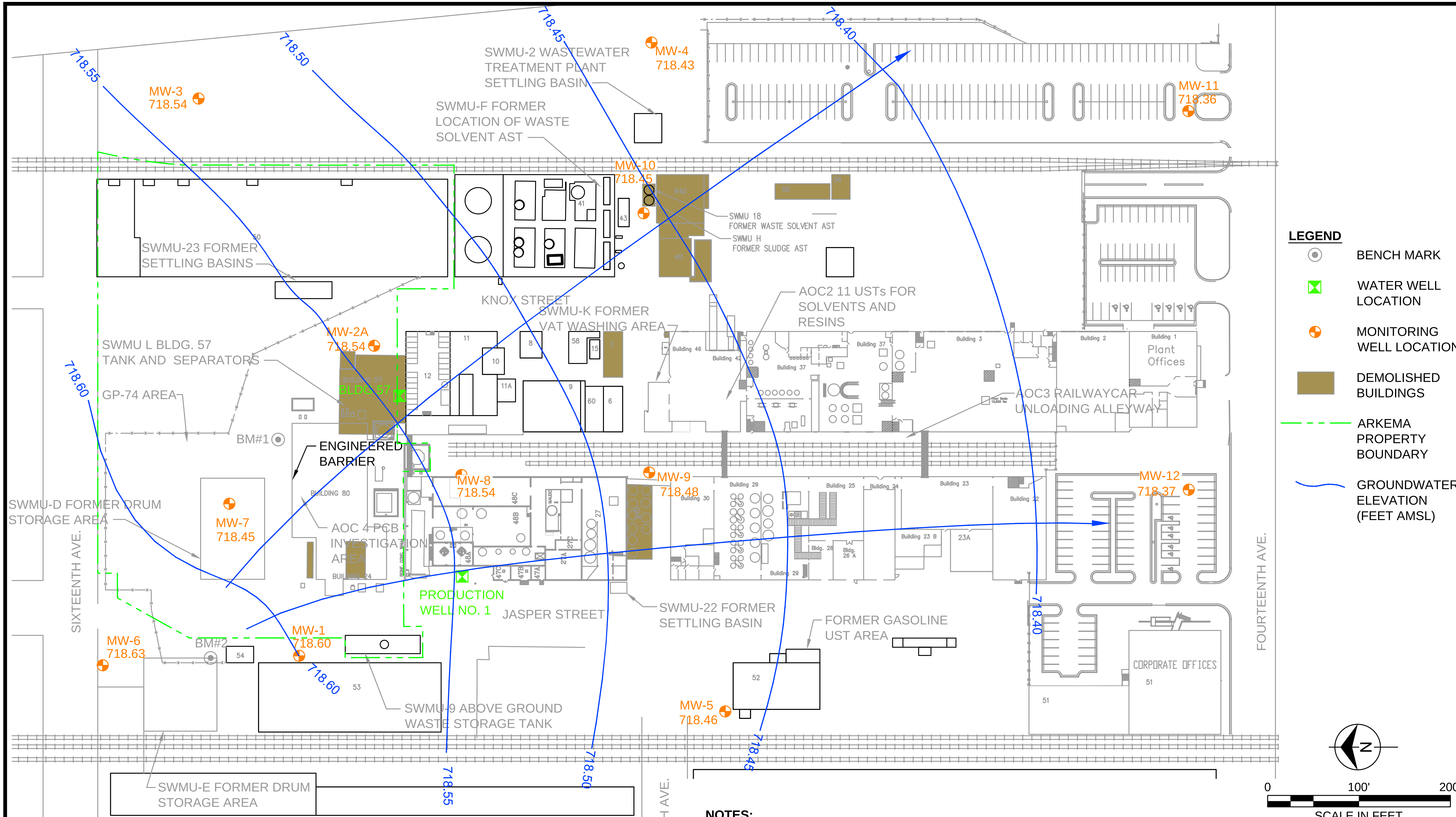
NOTES:

1. GROUNDWATER ELEVATIONS MEASURED ON 9/12/2011.
2. GROUNDWATER ELEVATION DATA FROM MONITORING WELL MW-7 WAS NOT USED IN DEVELOPING THE CONTOURS.

Burns & McDonnell SINCE 1898

Figure 4-6
GROUNDWATER ELEVATION CONTOUR MAP - 9/12/2011
COOK COMPOSITES AND POLYMERS CO.
N. KANSAS CITY, MISSOURI

K:\ENV\COOK COMPOSITES AND POLYMERS\SITE\60920\CAD\SEPT 2011\60920-GROUNDWATER-ELEV-FIG4-6.DWG 3/28/2012 9:42 AM MCCOCHRAN



NOTES:

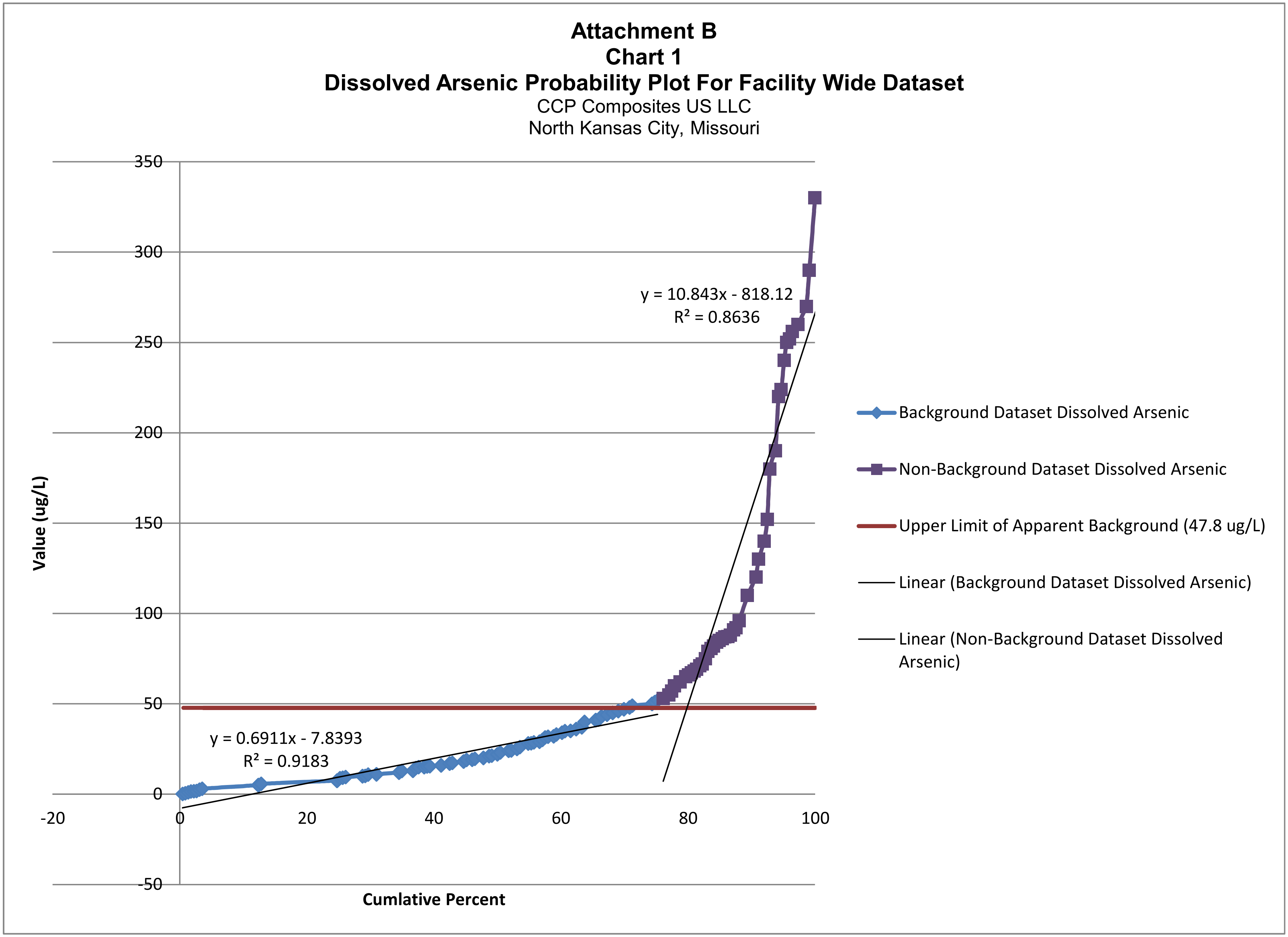
1. GROUNDWATER ELEVATIONS MEASURED ON 4/24/2012.
2. GROUNDWATER ELEVATION DATA FROM MONITORING WELL MW-7 WAS NOT USED IN DEVELOPING THE CONTOURS.

Burns & McDonnell SINCE 1898

Figure 4-1
GROUNDWATER ELEVATION CONTOUR MAP - 4/24/2012
CCP COMPOSITES US
N. KANSAS CITY, MISSOURI

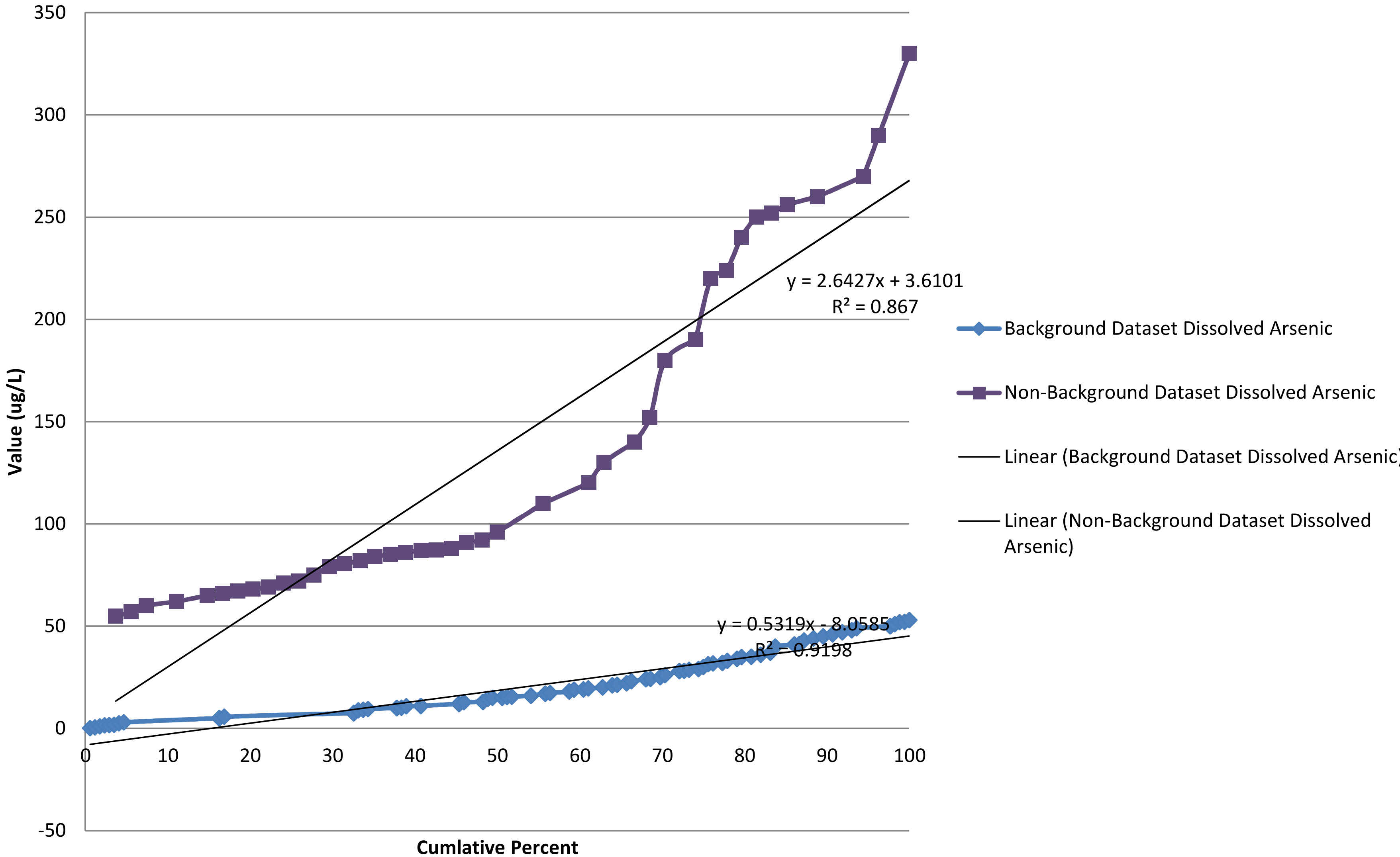
K:\ENV\CCP COMPOSITES US\SITE\67221\CAD\GW APRIL 2012\67221-GROUNDWATER-ELEV-FIG4-1.DWG 11/5/2012 9:31 AM TDUCKER

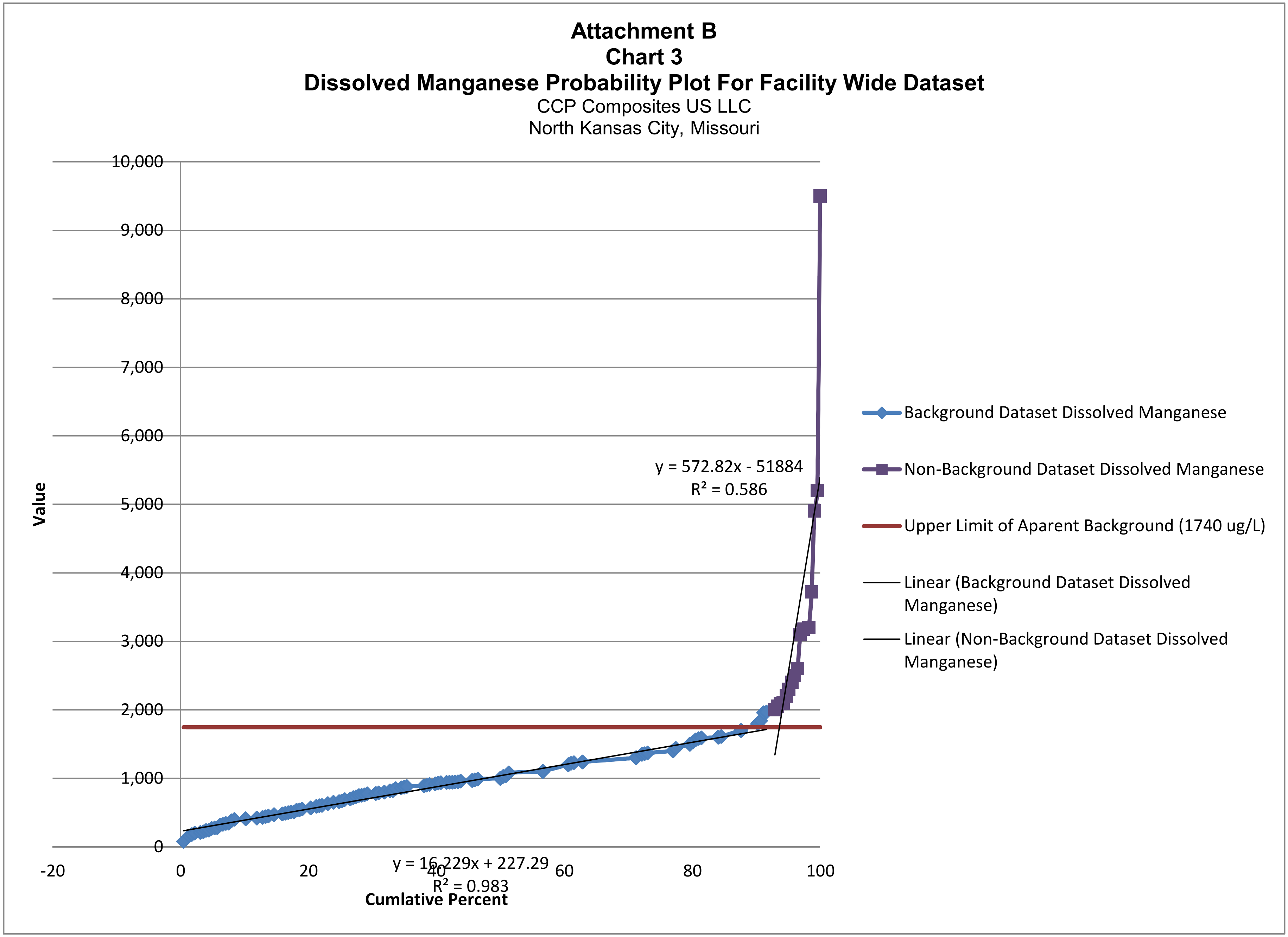
ATTACHMENT B – PROBABILITY PLOTS



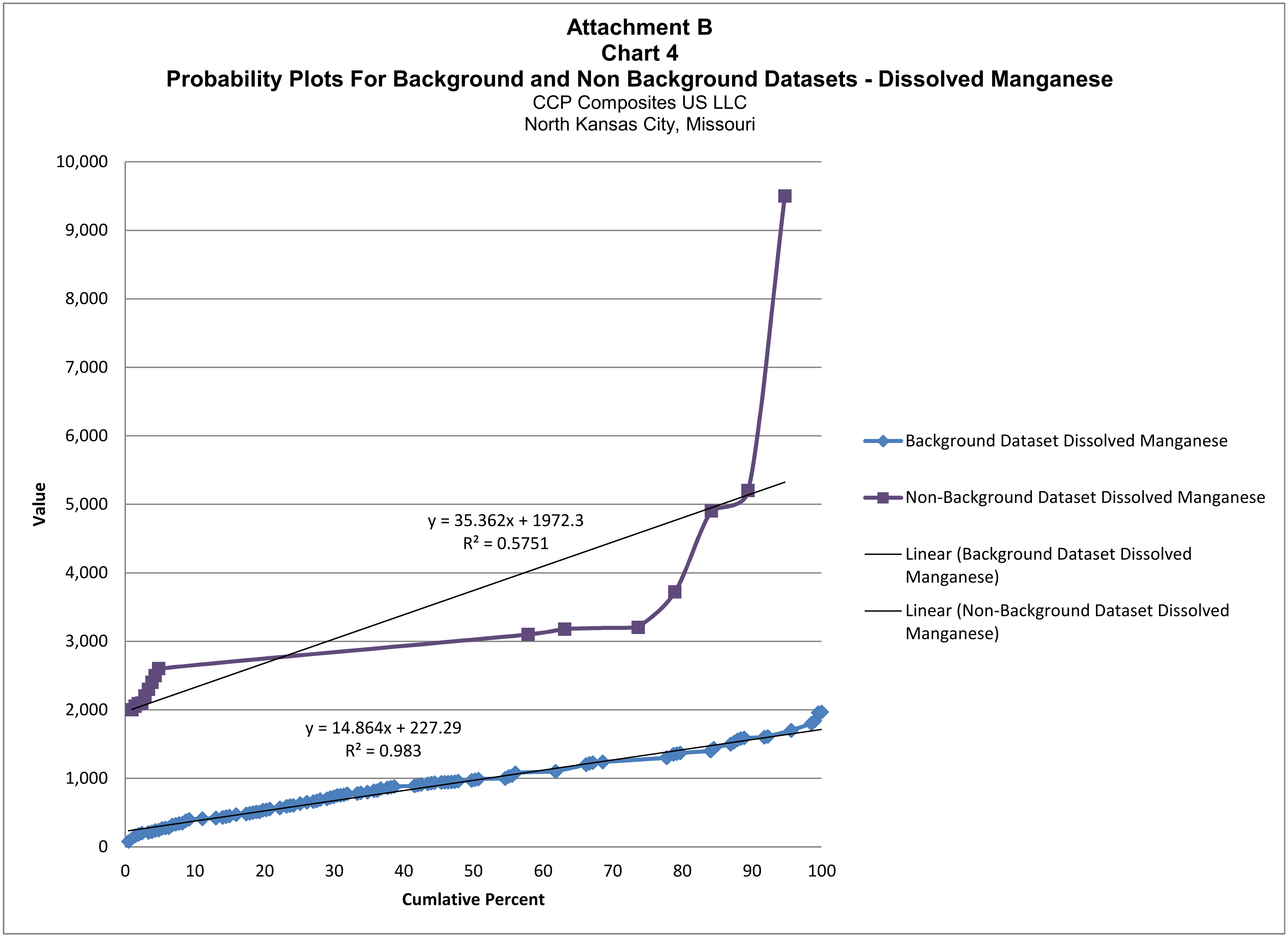
Attachment B
Chart 1
Dissolved Arsenic Probability Plot For Facility Wide Dataset
CCP Composites US LLC
North Kansas City, Missouri
y = 10.843x - 818.12
R² = 0.8636
y = 0.6911x - 7.8393
R² = 0.9183
350
300
250
200
150
100
50
0
-50
-20
0
20
40
60
80
100
Value (ug/L)
Cumlative Percent
Background Dataset Dissolved Arsenic
Non-Background Dataset Dissolved Arsenic
Upper Limit of Apparent Background (47.8 ug/L)
Linear (Background Dataset Dissolved Arsenic)
Linear (Non-Background Dataset Dissolved Arsenic)

Attachment B
Chart 2
Probability Plots For Background and Non Background Datasets - Dissolved Arsenic
CCP Composites US LLC
North Kansas City, Missouri





Attachment B
Chart 3
Dissolved Manganese Probability Plot For Facility Wide Dataset
CCP Composites US LLC
North Kansas City, Missouri
Value
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
-20
0
20
40
60
80
100
Cumlative Percent
y = 572.82x - 51884
R² = 0.586
y = 16.229x + 227.29
R² = 0.983
Background Dataset Dissolved Manganese
Non-Background Dataset Dissolved Manganese
Upper Limit of Aparent Background (1740 ug/L)
Linear (Background Dataset Dissolved Manganese)
Linear (Non-Background Dataset Dissolved Manganese)


Attachment B
Chart 4
Probability Plots For Background and Non Background Datasets - Dissolved Manganese
CCP Composites US LLC
North Kansas City, Missouri
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
Value
0
10
20
30
40
50
60
70
80
90
100
Cumlative Percent
y = 35.362x + 1972.3
R² = 0.5751
y = 14.864x + 227.29
R² = 0.983
Background Dataset Dissolved Manganese
Non-Background Dataset Dissolved Manganese
Linear (Background Dataset Dissolved Manganese)
Linear (Non-Background Dataset Dissolved Manganese)

ATTACHMENT C – t-TEST RESULT

Attachment C

Dissolved Arsenic t-Test Resuls - Background vs. Non-Background Populations

CCP Composites US LLC

North Kansas City, Missouri

t-Test: Two-Sample Assuming Equal Variances		
	Variable 1	*Variable 2*
Mean	19.87752907	139.6444444
Variance	227.4256039	6923.063648
Observations	172	54
Pooled Variance	1811.661391	
Hypothesized Mean Difference	0	
df	224	
t Stat	-18.0386999	
P(T<=t) one-tail	7.91487E-46	
t Critical one-tail	1.65168456	
P(T<=t) two-tail	1.58297E-45	
t Critical two-tail	1.970610961	

t-Test: Two-Sample Assuming Unequal Variances		
	Variable 1	*Variable 2*
Mean	19.87752907	139.6444444
Variance	227.4256039	6923.063648
Observations	172	54
Hypothesized Mean Difference	0	
df	54	
t Stat	-10.52341028	
P(T<=t) one-tail	5.44685E-15	
t Critical one-tail	1.673564906	
P(T<=t) two-tail	1.08937E-14	
t Critical two-tail	2.004879288	

Note:

1 - Background and non-background populations are identified on Table 2 and
the dissolved manganese probability plot presented as Chart 3 of Attachment B.

Attachment C
Dissolved Manganese t-Test Resuls - Background vs. Non-Background Populations
CCP Composites US LLC
North Kansas City, Missouri

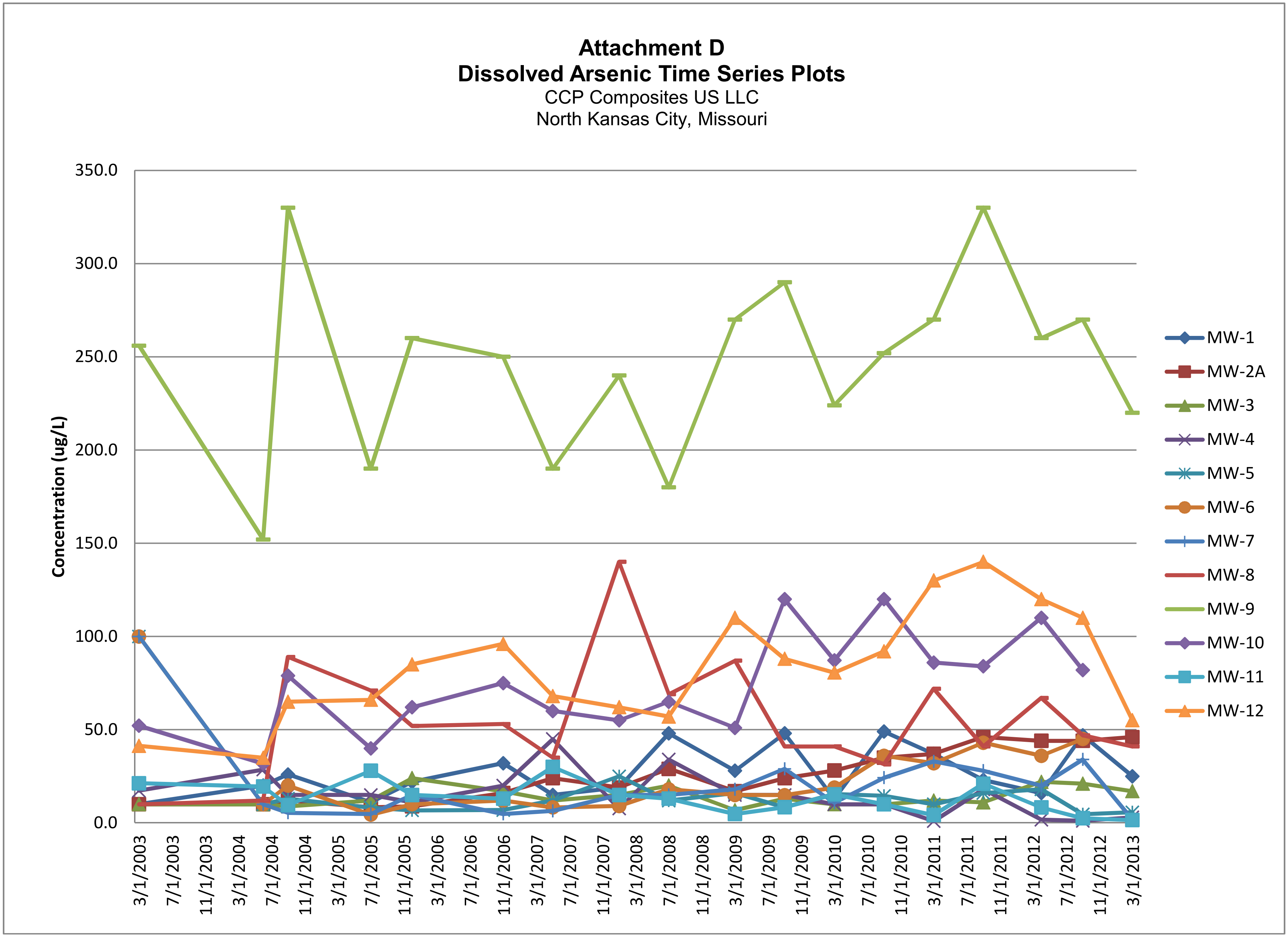
t-Test: Two-Sample Assuming Equal Variances		
	Variable 1	*Variable 2*
Mean	989.9855072	3170.526316
Variance	196514.4998	3234938.596
Observations	207	19
Pooled Variance	440673.579	
Hypothesized Mean Difference	0	
df	224	
t Stat	-13.70293085	
P(T<=t) one-tail	9.54919E-32	
t Critical one-tail	1.65168456	
P(T<=t) two-tail	1.90984E-31	
t Critical two-tail	1.970610961	

t-Test: Two-Sample Assuming Unequal Variances		
	Variable 1	*Variable 2*
Mean	989.9855072	3170.526316
Variance	196514.4998	3234938.596
Observations	207	19
Hypothesized Mean Difference	0	
df	18	
t Stat	-5.269878217	
P(T<=t) one-tail	2.59811E-05	
t Critical one-tail	1.734063607	
P(T<=t) two-tail	5.19622E-05	
t Critical two-tail	2.10092204	

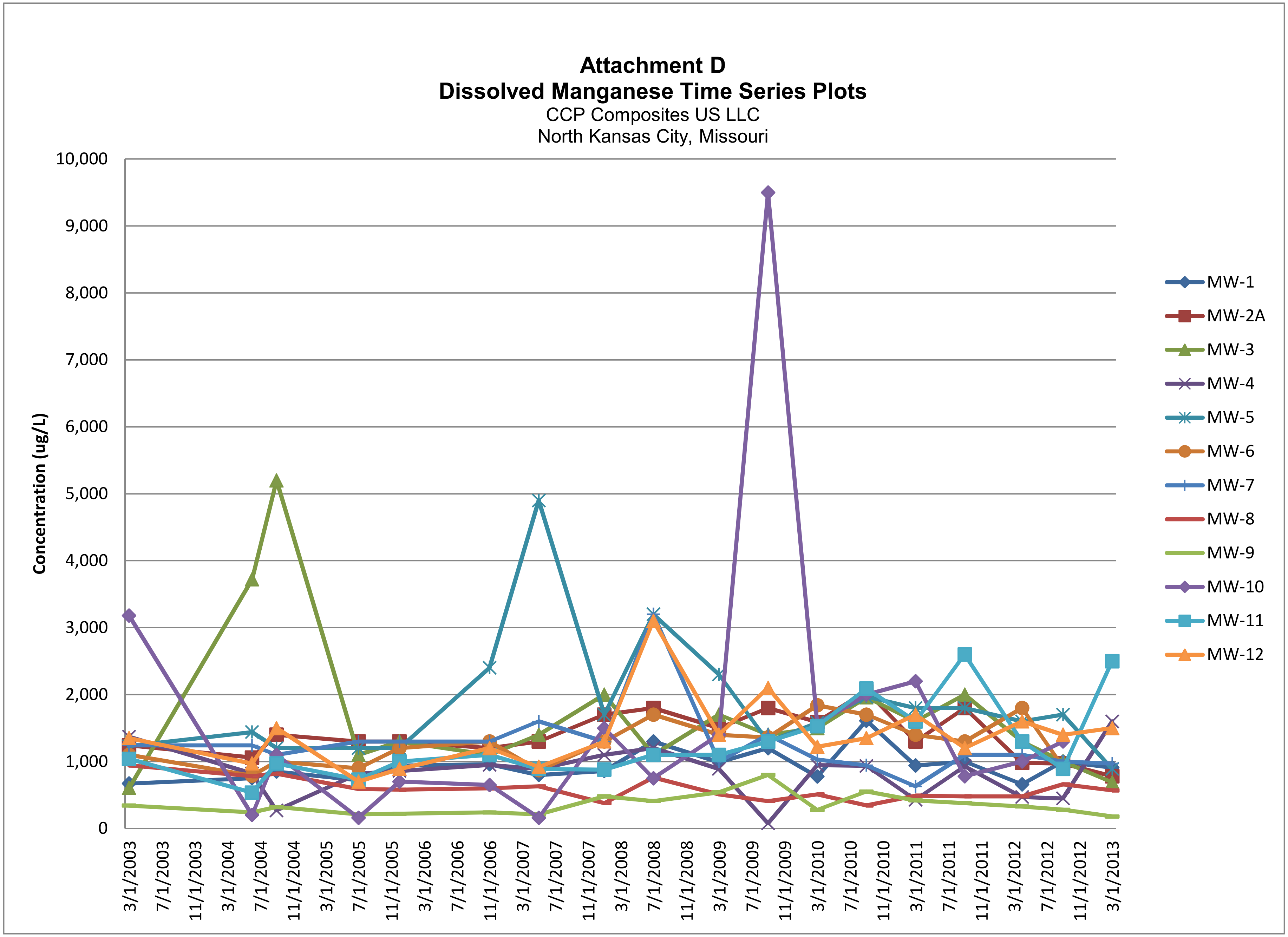
Note:

1 - Background and non-background populations are identified on Table 3 and the dissolved manganese probability plot presented as Chart 3 of Attachment B.

ATTACHMENT D – TIME SERIES CHARTS



Attachment D
Dissolved Arsenic Time Series Plots
CCP Composites US LLC
North Kansas City, Missouri
Concentration (ug/L)
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
3/1/2003
7/1/2003
11/1/2003
3/1/2004
7/1/2004
11/1/2004
3/1/2005
7/1/2005
11/1/2005
3/1/2006
7/1/2006
11/1/2006
3/1/2007
7/1/2007
11/1/2007
3/1/2008
7/1/2008
11/1/2008
3/1/2009
7/1/2009
11/1/2009
3/1/2010
7/1/2010
11/1/2010
3/1/2011
7/1/2011
11/1/2011
3/1/2012
7/1/2012
11/1/2012
3/1/2013
MW-1
MW-2A
MW-3
MW-4
MW-5
MW-6
MW-7
MW-8
MW-9
MW-10
MW-11
MW-12


Attachment D
Dissolved Manganese Time Series Plots
CCP Composites US LLC
North Kansas City, Missouri
Concentration (ug/L)
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
3/1/2003
7/1/2003
11/1/2003
3/1/2004
7/1/2004
11/1/2004
3/1/2005
7/1/2005
11/1/2005
3/1/2006
7/1/2006
11/1/2006
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7/1/2010
11/1/2010
3/1/2011
7/1/2011
11/1/2011
3/1/2012
7/1/2012
11/1/2012
3/1/2013
MW-1
MW-2A
MW-3
MW-4
MW-5
MW-6
MW-7
MW-8
MW-9
MW-10
MW-11
MW-12